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E83-10284

FULL SCALE LANDSAT-D ANTENNA PATTERN MEASUREMENTS

FINAL REPORT

Project Engineer Cecil Post
Approved A. Waterman

Prepared for

General Electric Company
Space Vehicle Division
Valley Forge, Pennsylvania

Sub-Contract No. A20661

December 1979

New Mexico State University
Physical Science Laboratory
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(E83-10284) FULL SCALE LANDSAT-D ANTENNA PATTERN MEASUREMENTS Final Report (New Mexico State Univ.) 369 p HC A16/MF A01 CSCL 20N
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G3/43 10284

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Acknowledgment

Assistance provided by the Physical Science Laboratory personnel Mr. George Conrad, Mechanical Engineer, and Mr. Philip Manz, Machine Shop Supervisor is acknowledged with appreciation.

Messrs. Charles Allen, H. Williams, and J. Seitner of General Electric Company, Space Systems Operations, Valley Forge, Pennsylvania provided assistance, and served as GE/SSO Cognizant Engineers.

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1.0 PROBLEM STATEMENT

1.1 Scope

The Physical Science Laboratory, New Mexico State University contracted to support development and design verification of the Landsat-D antenna subsystem for the General Electric Company Space Vehicle Division, Vally Forge, Pennsylvania.

Test antennas were furnished by the General Electric Company. The full scale Landsat-D antenna test model was constructed by NMSU/PSL. In addition a simulated, operating High-Gain antenna was fabricated at PSL. The S-Band feed for this antenna was provided by TRW Company by Contract arrangement with GE/SVD. Preliminary Drawings DWG 475252304 were provided by GE/SVD for the antenna test model to be designed and constructed.

2.0 <u>UNIT ANTENNAS</u>

2.1 Antennas Furnished by GE/SVD

2.1.1 Two each S-Band shaped beam antennas (No. 1 and No. 2) to operate at 2265.5 MHz - Right Circular Polarization.

2.1.2 Two each S-Band omni unit radiators (No. 1 and No. 2) to operate in an array of two at 2106.4 and 2287.5 MHz - Right Circular Polarization.

2.1.3 One GPS antenna to operate at 1575.42 MHz and 1227.6 MHz - Right Circular Polarization.

2.2 Antennas Furnished by TRW

2.2.1 One X-Band shaped beam antenna to operate at 8212.5 MHz - Right Circular Polarization.

2.2.2 S-Band breadboard feed for High-Gain antenna.

2.3 Antenna to be furbished at PSL.

2.3.1 One S-Band high-gain parabolic antenna.

3.0 MECHANICAL

3.1 Antenna Range Telescoping Tower

3.1.1 To position the test vehicle above the antenna range platform floor, and to lower it to a height where range technicians were able to reach the various antennas safely, a telescoping, mounting tower was fabricated. This tower allowed the center line of the vehicle held horizontal to be placed 15 feet above the floor, and when elevated as shown on Fig. 1 the horizontal center line (the X-axis) was at 23 feet above the floor. The 23 foot position allowed the solar array to just clear the floor of the tower platform during antenna pattern measurement.

3.2 High-Gain Antenna In Stowed Position On Mockup

3.2.1 The photograph, Fig. 2, taken during the vehicle construction period shows a front view of the High-Gain antenna stowed for launch. The next page, Fig. 3, shows a back view of the High-Gain antenna stowed.

3.3 Completed Landsat-D Antenna Test Model

3.3.1 The completed test model shown on Fig. 4 was mounted on the antenna range telescoping tower prior to mounting the assembly on the antenna range tower. This test was constructed to check fit, operation and compatibility of the entire vehicle and test mounts.

3.3.2 Wind loads on this complete assembly could have produced a dangerous condition for both personnel and the equipment when mounted on the 70 foot antenna range tower. This test was a precautionary move.

3.3.3 The superstructure supports on the solar array were fabricated from fiberglass tubing to minimize radio frequency reflections and non-flight interference.

3.3.4 The photograph Fig. 5 shows the complete assembly mounted on the NMSU/PSL antenna range tower ready for testing. The High-Gain antenna is stowed for launch. The solar array is fully deployed and points toward (-Z). This configuration will be defined as the alternate orbit configuration. In this case, the top edge of the High-Gain antenna is 112 feet above local ground.

3.3.5 The photograph Fig. 6 shows the complete assembly with the solar array pointing toward (-X). The High-Gain antenna is deployed and points in the (-Z) direction.

3.3.6 The solar array active surface is the flat area on the (-X) side of the vehicle.

Fig. 1 - Telescoping Antenna Range Tower

Fig. 2 - Launch Configuration for High-Gain Antenna

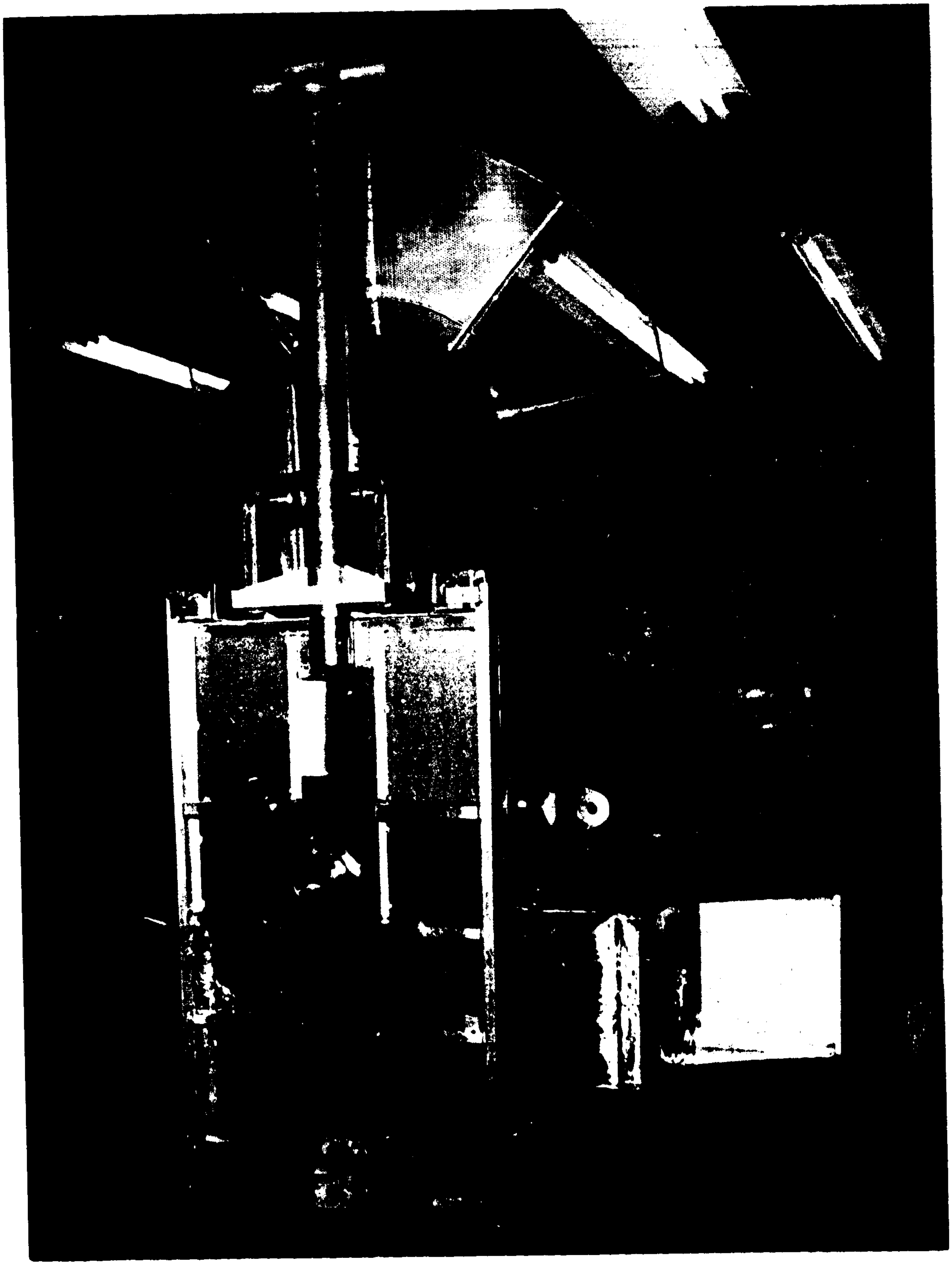

Fig. 3 - Launch Configuration for High-Gain Antenna

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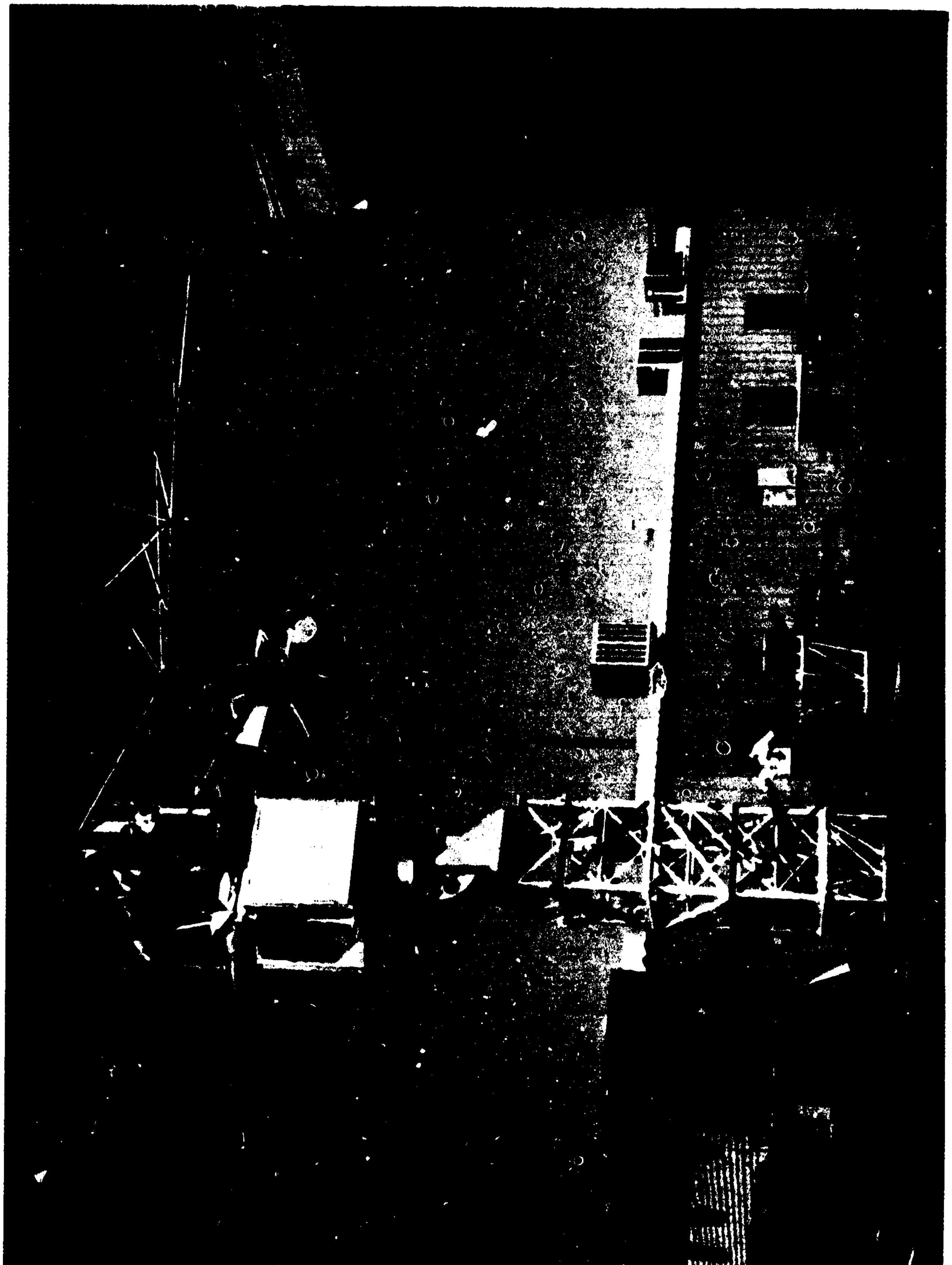

Fig. 4 - Completed Test Model and Range Tower Mount

Fig. 5 - Mounted on Antenna Range
Alternate Orbit Configuration

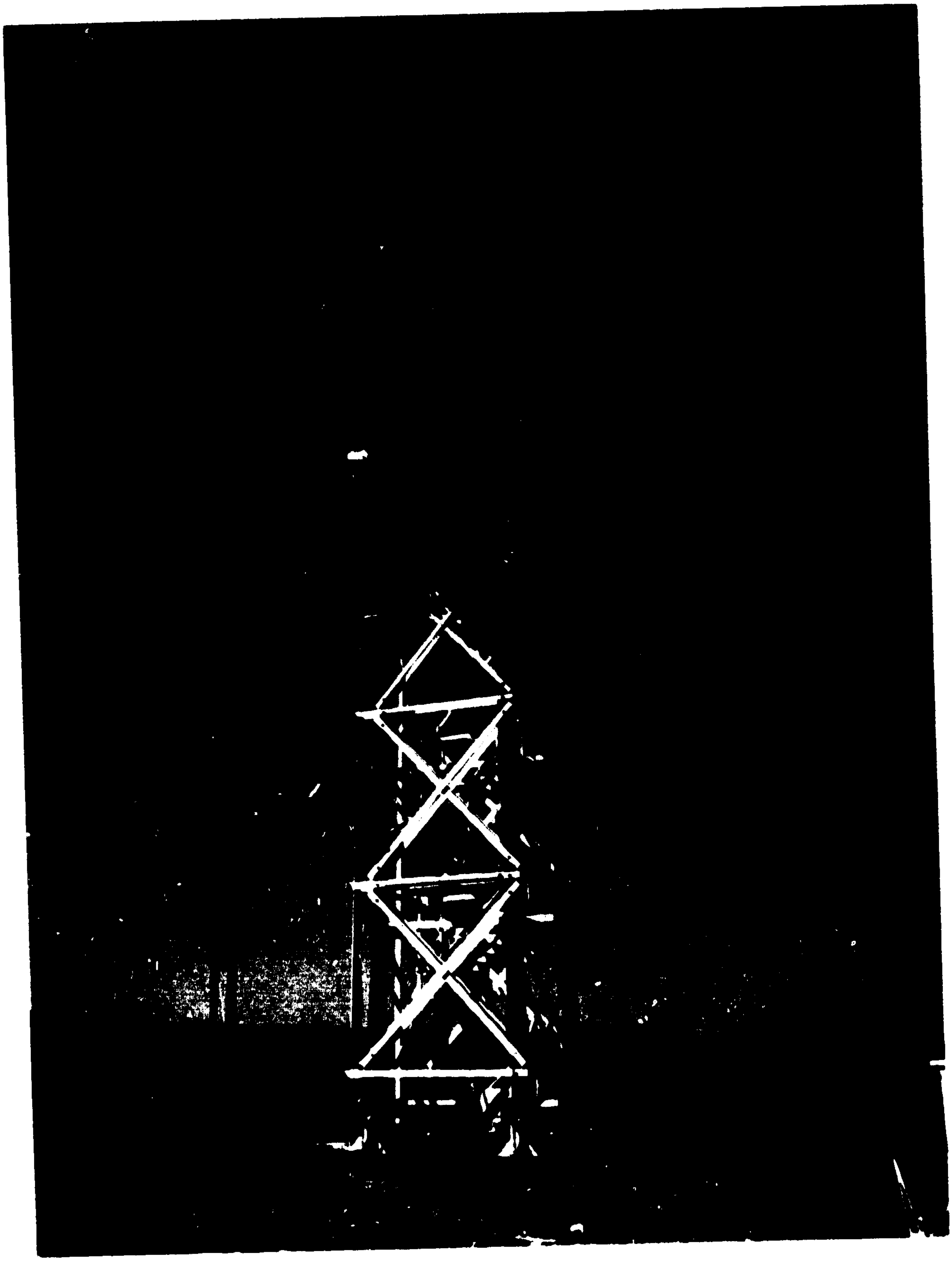

Fig 6 - Mounted on Antenna Range
Normal Orbit Configuration

4.0 IMPEDANCE MEASUREMENTS

4.1 Omni Unit Radiators

4.1.1 Impedance characteristics of units No.'s 1 and 2 are presented on Fig.'s 7 and 8.

4.2 S-Band Shaped Beam Antennas

4.2.1 Impedance characteristics of antenna No. 1 is shown on Fig. 9 and antenna No. 2 is shown on Fig. 10.

4.3 X-Band Antennas

4.3.1 Two different breadboard models of the antenna were shipped to PSL by TRW. Both units were used during the test phases. Final antenna pattern measurements were taken with model No. 2.

4.3.2 Impedance characteristics of breadboard model No. 1 are presented on Fig. 11.

4.3.3 X-Band breadboard model No. 2 impedance characteristics are shown on Fig. 12.

4.4 GPS Antenna

4.4.1 Impedance characteristics for the GPS antenna are shown on Fig. 13.

4.5 High-Gain Antenna S-Band Feed

4.5.1 Impedance characteristics of the breadboard model of the TRW S-Band feed for the High-Gain parabolic antenna are shown on Fig. 14. The Ku-Band dichroic reflector was not included in any of the measurements at PSL.

4.6 Spiral Launch Pickup Probe

4.6.1 A spiral pickup similar to those units used on earlier NIMBUS satellites by GE/SVD was asssembled at PSL. Figures 15 and 16 show impedance characteristics from 1200 to 1600 MHz and 2050 to 2800 MHz for this spiral probe antenna.

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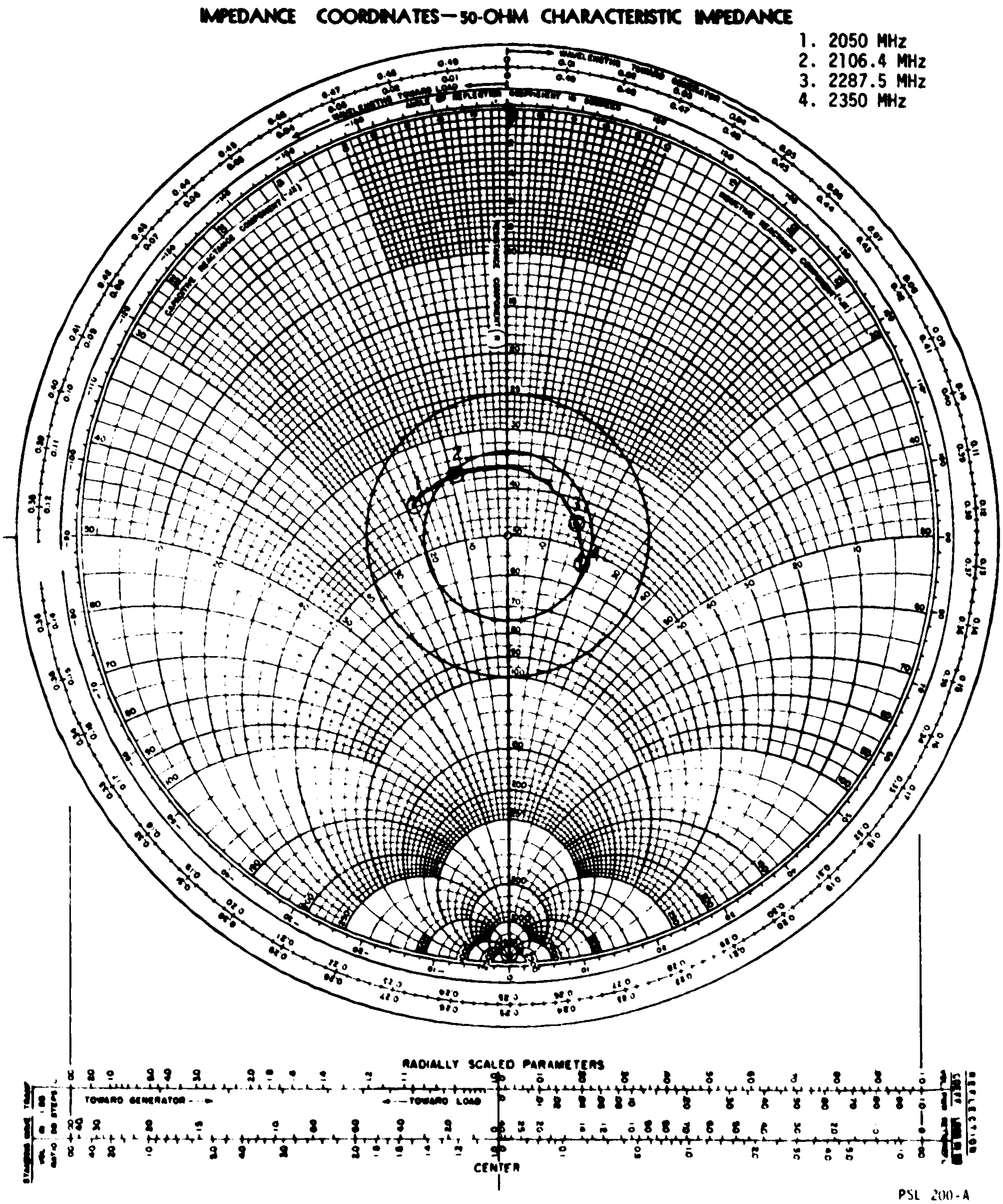

Fig. 7 - Omni Unit No. 1 Impedance

IMPEDANCE COORDINATES—50-OHM CHARACTERISTIC IMPEDANCE

1. 2050 MHz
2. 2106.4 MHz
3. 2287.5 MHz
4. 2350 MHz

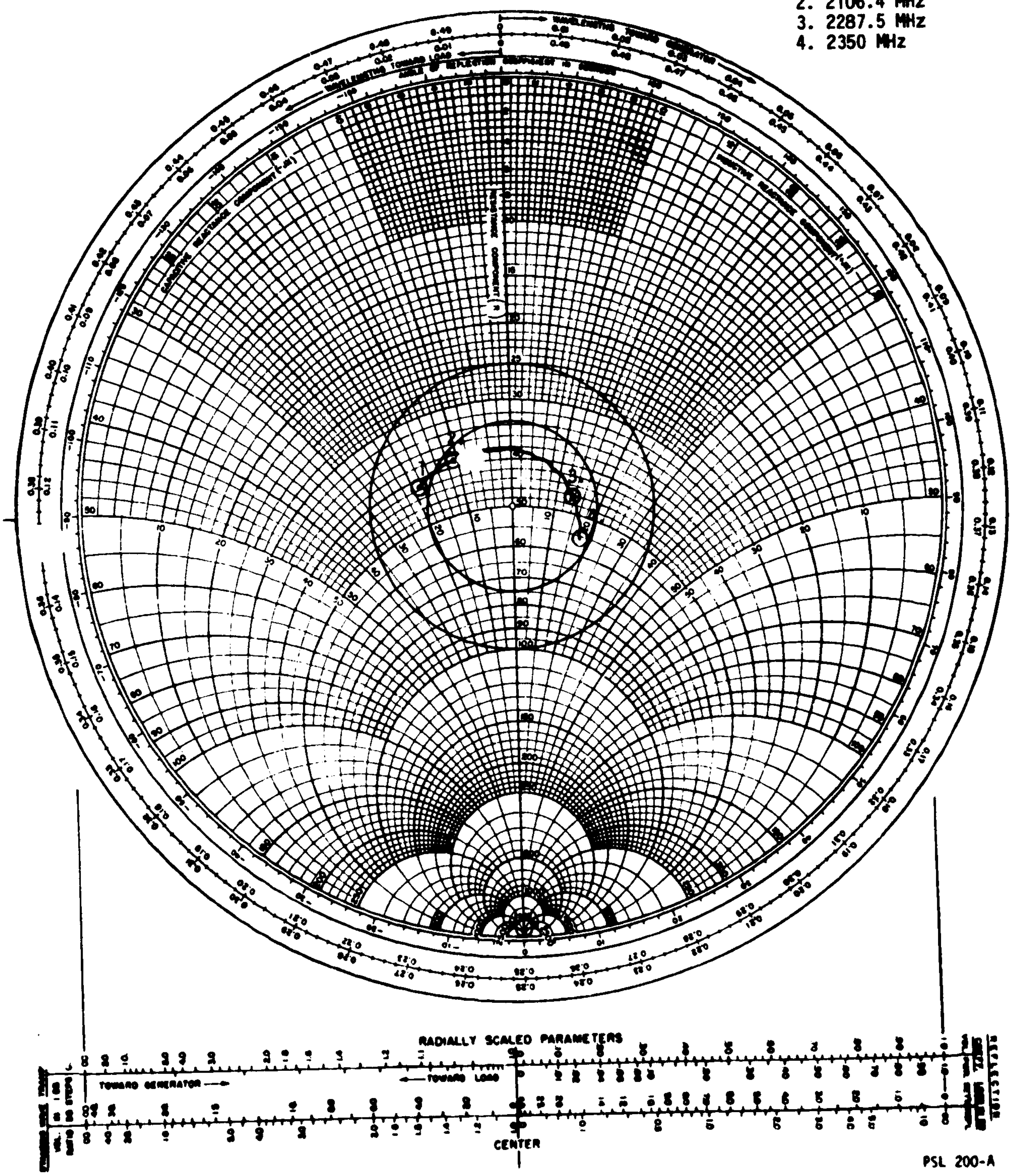

Fig. 3 - Omni Unit No. 2 Impedance

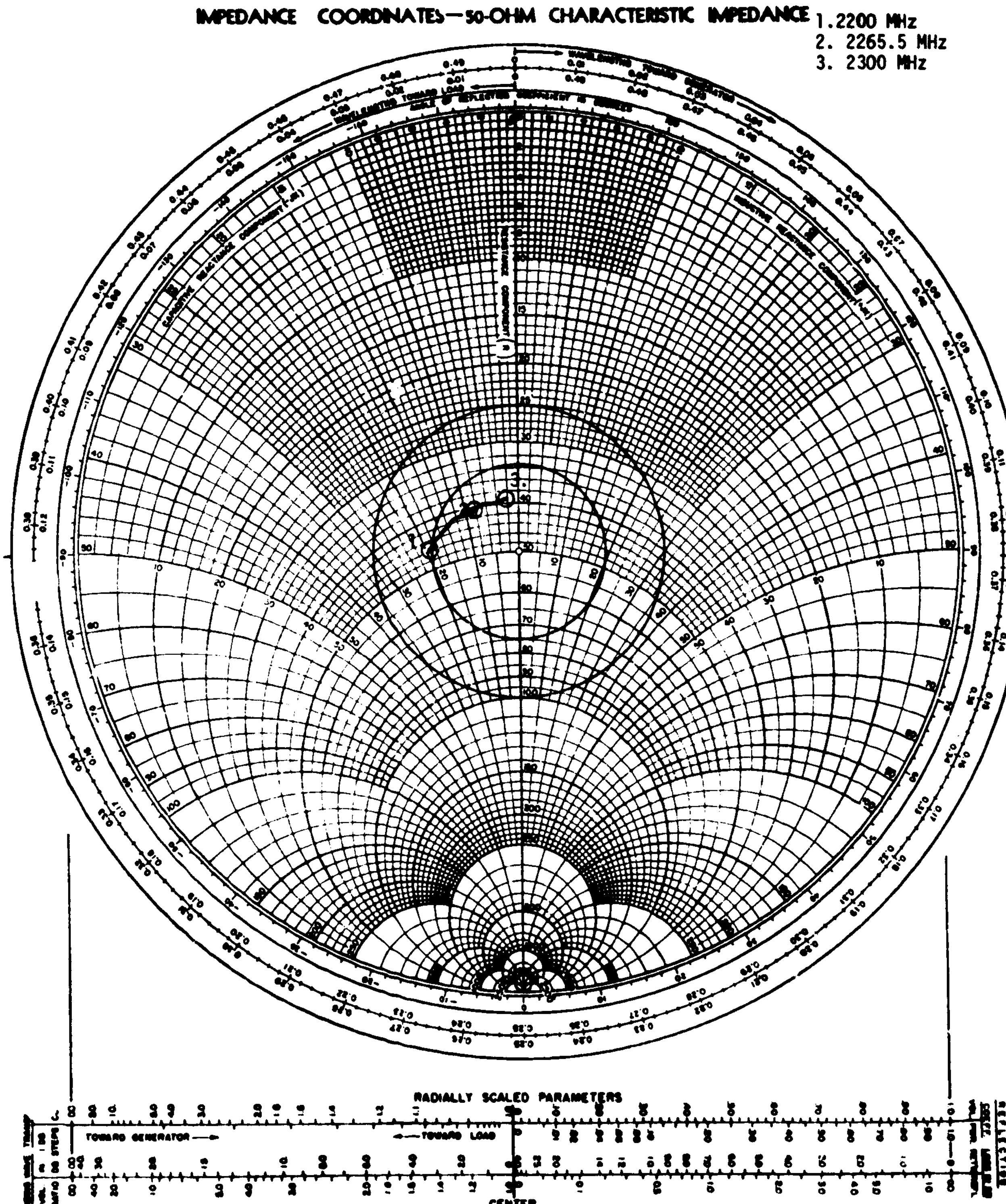

Fig. 9 - S-Band Shaped Beam No. 1 Impedance

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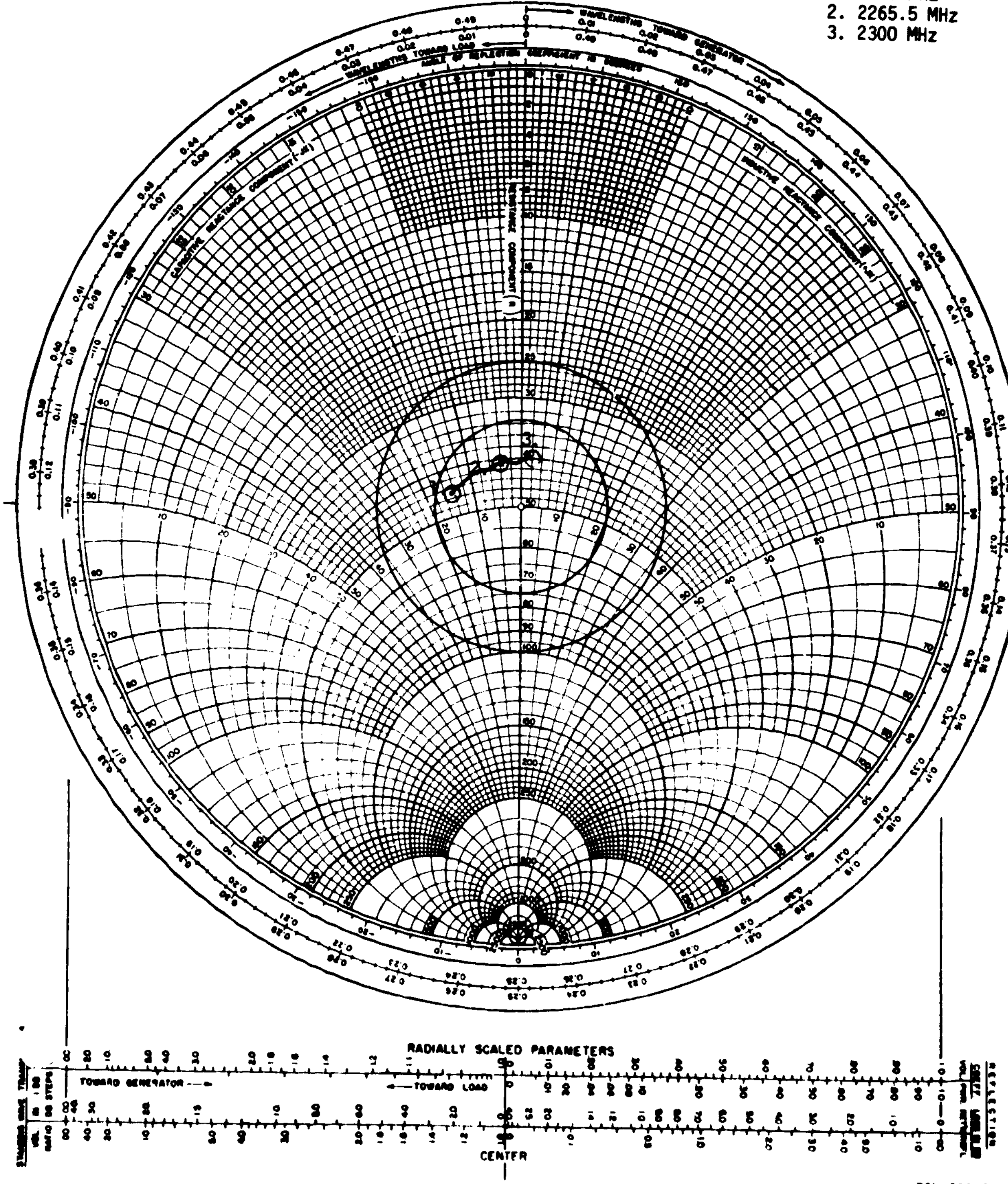
IMPEDANCE COORDINATES—50-OHM CHARACTERISTIC IMPEDANCE

1. 2200 MHz
2. 2265.5 MHz
3. 2300 MHz



PSL 200-A

Fig. 10 - S-Band Shaped Beam No. 2 Impedance

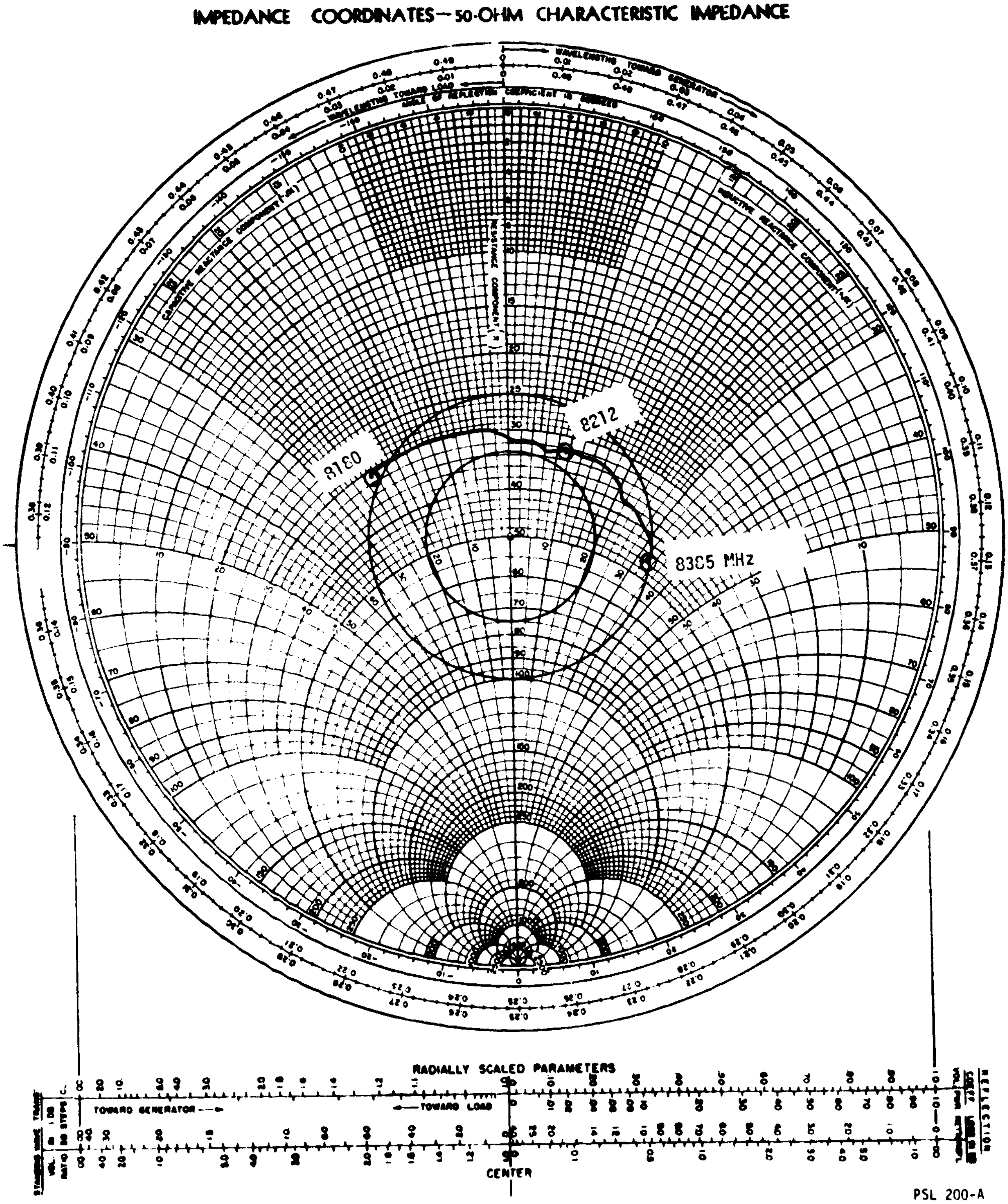


Fig. 11 - X-Band Shaped Beam No. 1 Impedance

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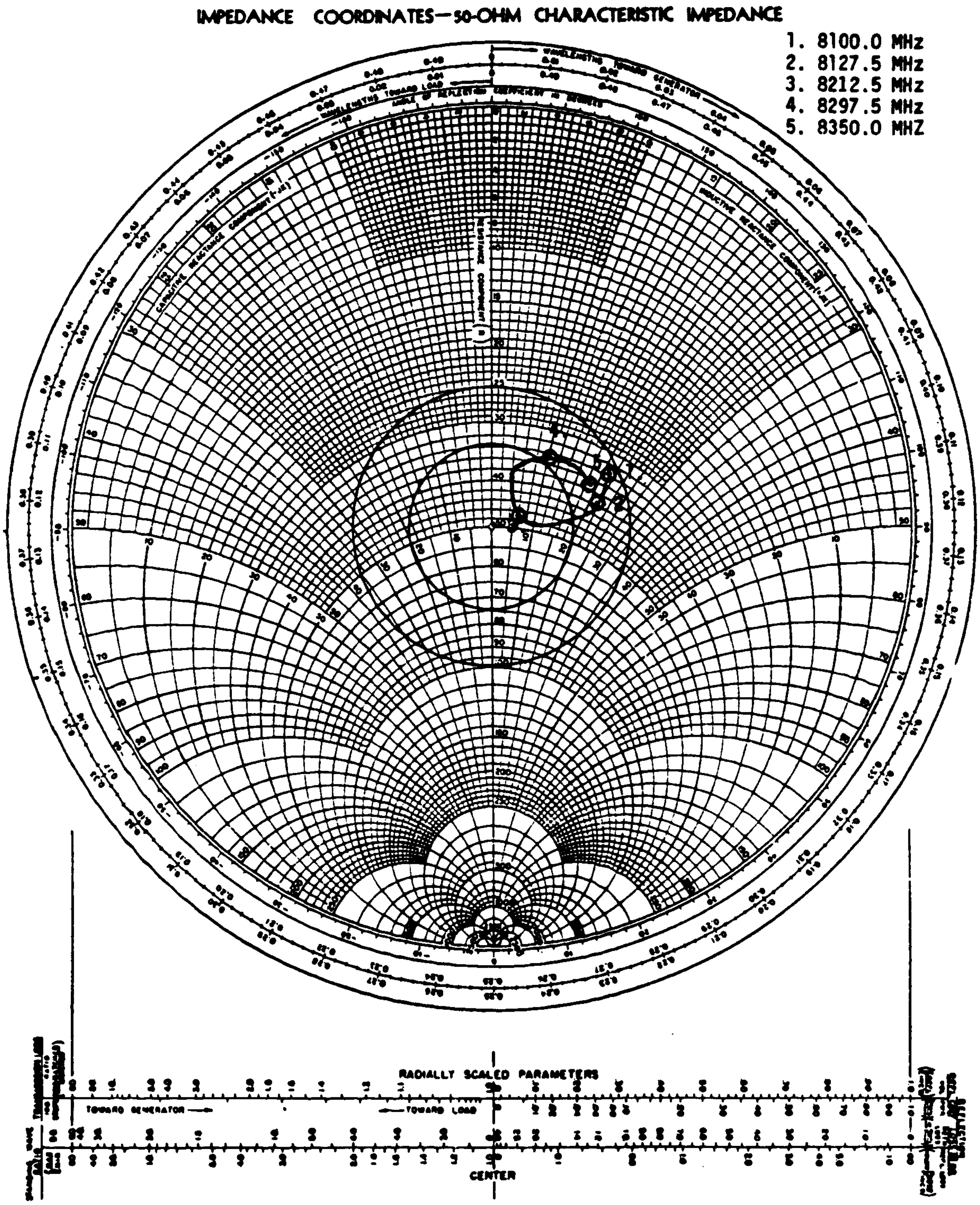

Fig. 12 - X-Band Shaped Beam No. 2 Impedance

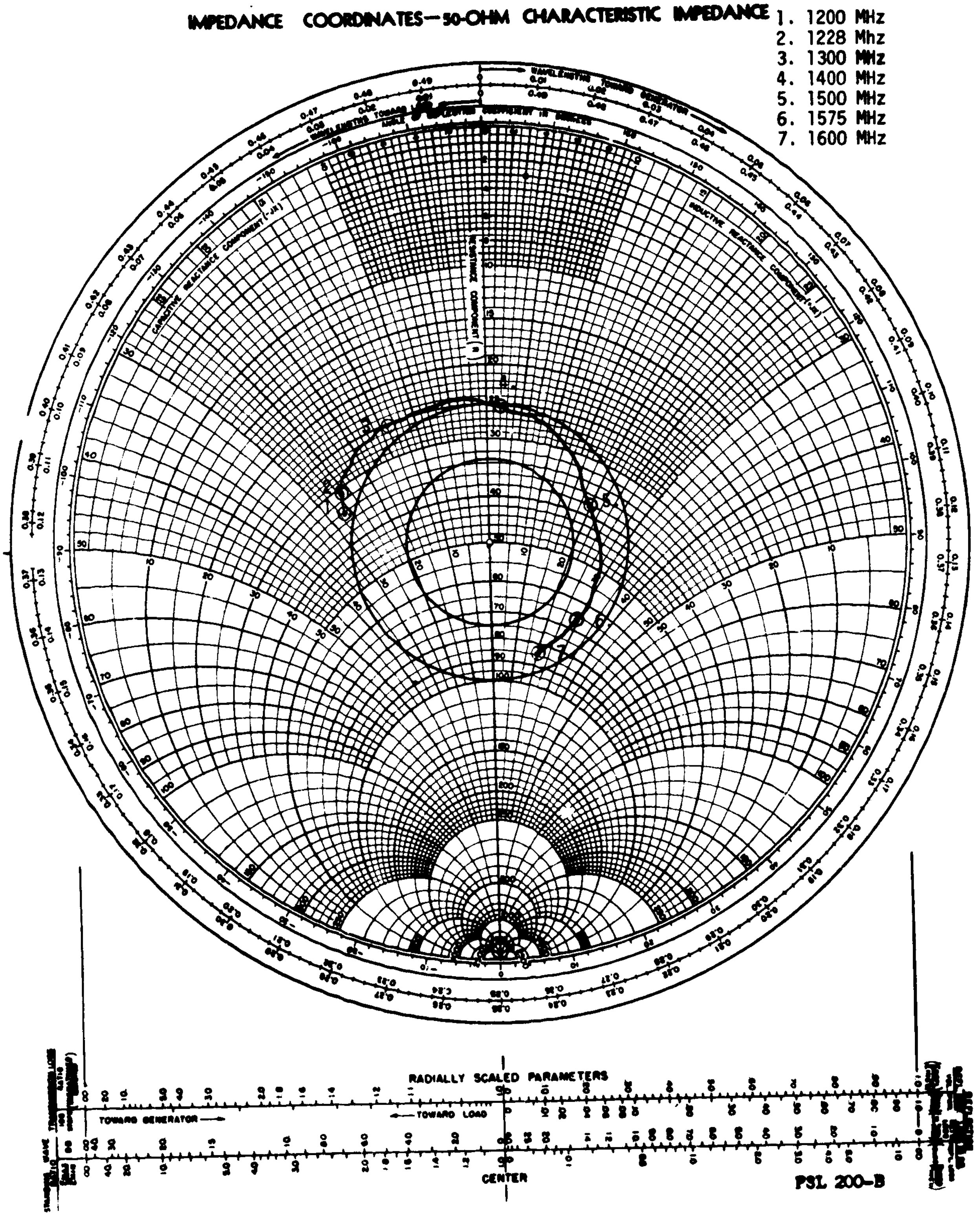

Fig. 13 - GPS Antenna Impedance

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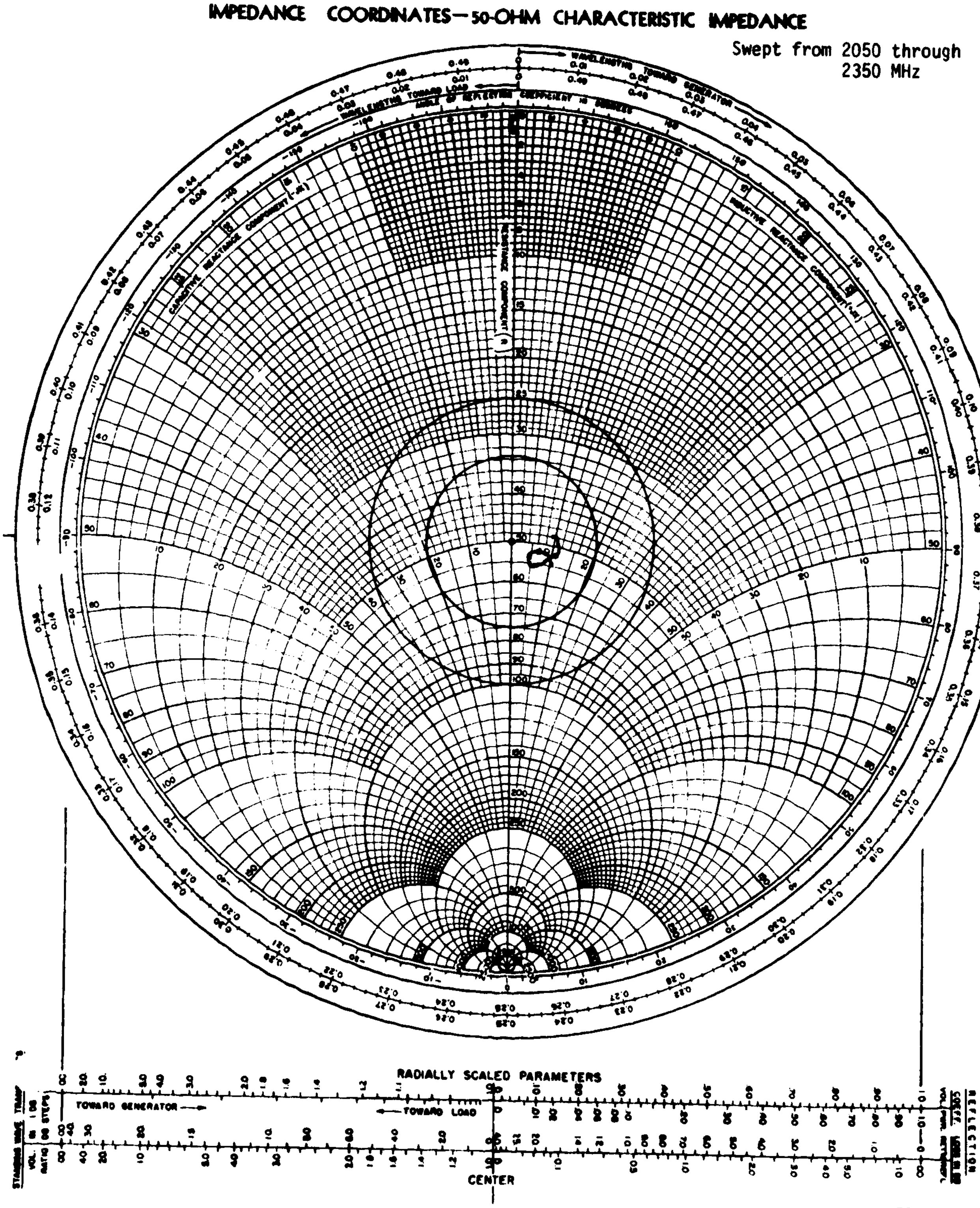

Fig. 14 - High-Gain Antenna S-Band Feed Impedance

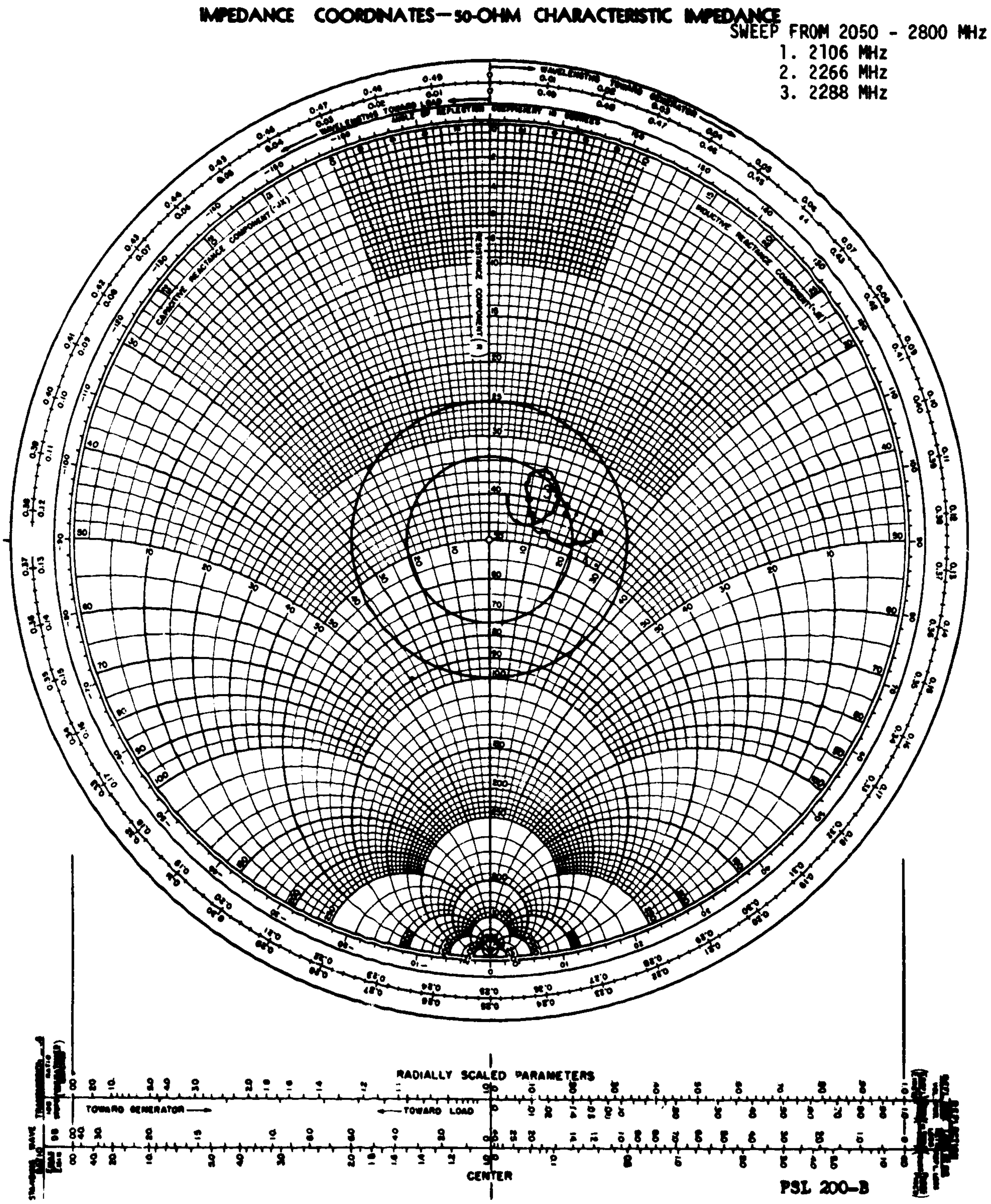

Fig. 15 - Spiral Pickup Impedance - 1200 to 1600 MHz

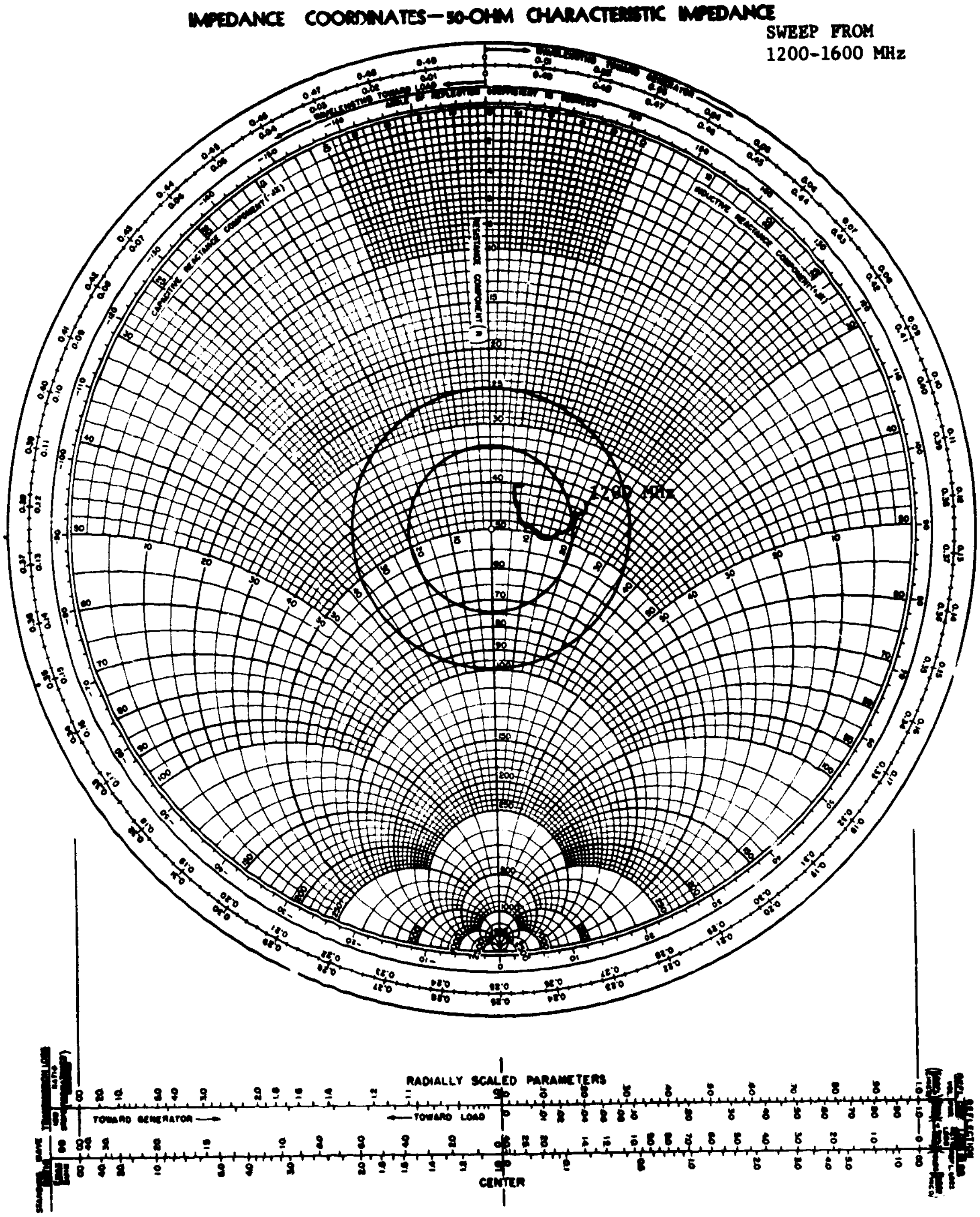

Fig. 16 - Spiral Pickup Impedance - 2050 to 2800 MHz

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5.0 MEASURED ISOLATION BETWEEN ANTENNAS

5.1 Measurement System

5.1.1 The measurement circuitry is shown by Fig. 17.

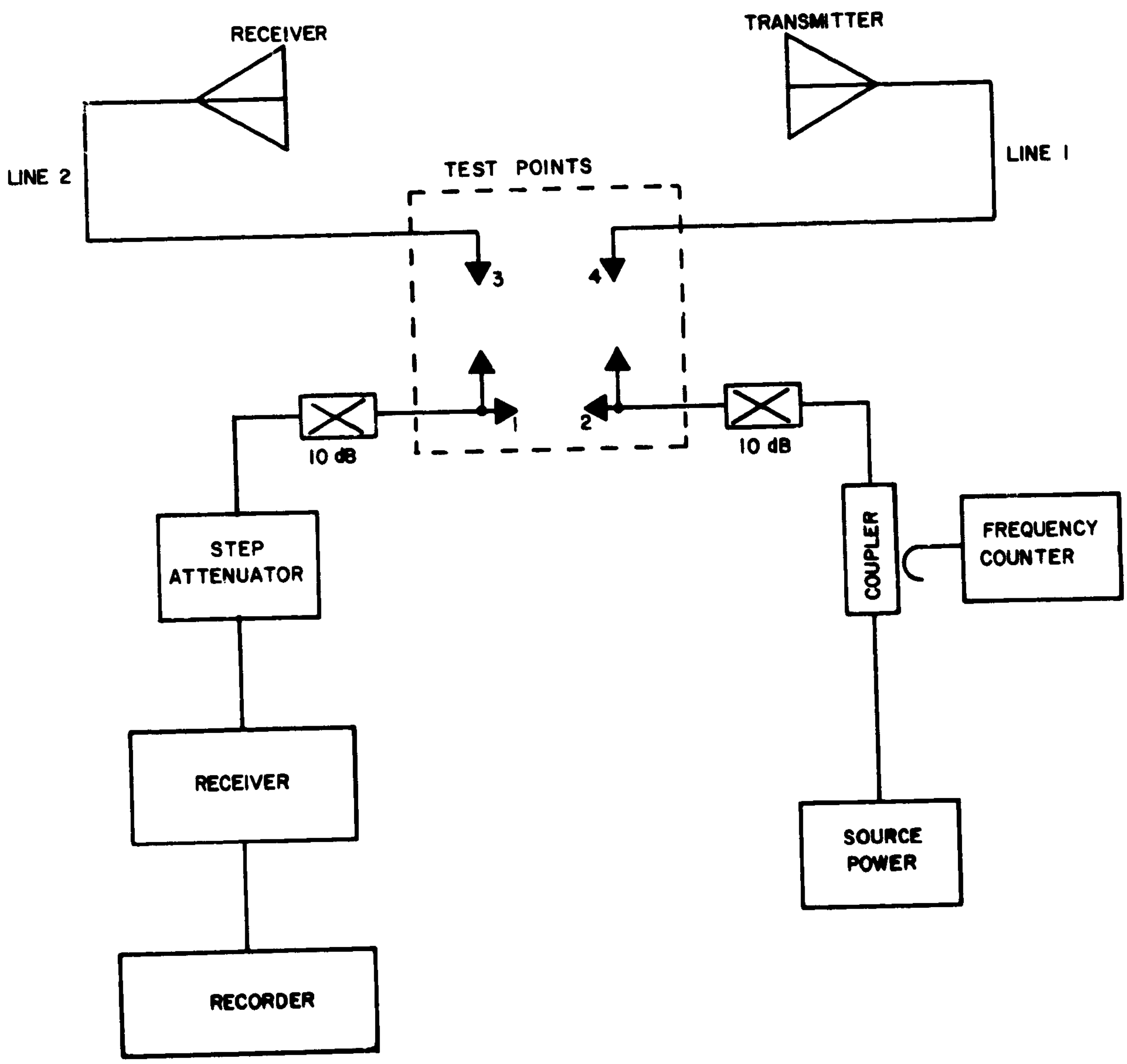

Fig. 17 - Isolation Test Circuit - Block Diagram

5.1.2 Test points 1 and 2 are first connected together with points 3 and 4 left open, or floating. The following steps are then performed.

a) Power is applied with sufficient attenuation in series at the step attenuator to protect the receiver from excessive input power.

b) Frequency is noted at the counter.

c) The receiver/recorder is adjusted to read a 0 dB level.

d) A linearity check is run (in 2 dB steps) to show that the receiver/ recorder system is linear over the available dynamic recording range.

e) The test points 1 and 2 are separated; point 1 is connected to point 3, and point 2 is connected to point 4.

f) The recorder level is noted.

g) The two lines (lines 1 and 2) are of equal length, and the line loss at each frequency has been measured prior to these tests.

h) Line loss is accounted for and applied to the measured level in (f) above. The isolation between the transmitter and receiver is thus completed.

5.2 Results of Isolation Measurements

5.2.1 Chart 1 outlines the results of the isolation measurements.

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TRANSMITTER	RECEIVER	FREQUENCY	RESULTS-ISOLATION
S-Band Shaped Beam # 1	Omni - A	2106.4 MHz	-49 dB
S-Band Shaped Beam # 1	Omni - A	2265.5 MHz	-49 dB
S-Band Shaped Beam # 1	GPS	1227.6 MHz	> -85 dB
S-Band Shaped Beam # 1	GPS	1575.4 MHz	> -85 dB
S-Band Shaped Beam # 1	GPS	2265.5 MHz	> -85 dB
S-Band Shaped Beam # 2	Omni - A	2106.4 MHz	-50 dB
S-Band Shaped Beam # 2	Omni - A	2265.5 MHz	-60 dB
S-Band Shaped Beam # 2	GPS	1227.6 MHz	> -85 dB
S-Band Shaped Beam # 2	GPS	1575.4 MHz	> -85 dB
S-Band Shaped Beam # 2	GPS	2265.5 MHz	> -85 dB
S-Band Shaped Beam #2	S-Band #1	2265.5 MHz	-46 dB
Omni - A	GPS	1227.6 MHz	-53 dB
Omni - A	GPS	1575.4 MHz	-62 dB
Omni - A	GPS	2287.4 MHz	-76 dB
X-Band Shaped Beam	Omni - A	8212.5 MHz	> -55 dB
X-Band Shaped Beam	GPS	8212.5 MHz	> -49 dB
X-Band Shaped Beam	S-Band #1	8212.5 MHz	> -49 dB
X-Band Shaped Beam	S-Band #2	8212.5 MHz	> -56 dB

Chart No. 1 - Measured Isolation Between Antennas

6.0 LAUNCH PROBE PICKUP MEASUREMENTS

6.1 S-Band Shaped Beam Antenna

6.1.1 Both units No.'s 1 and 2 were checked with the probe located as shown on Fig. 18. The separation distance is 1 inch. Frequency was swept from 2200 to 2300 MHz, and 2266 MHz was spotted on the graphs. The data are presented on Fig. 19 for No. 1 and Fig. 20 for No. 2.

6.2 S-Band Omni Unit Radiators

6.2.1 As shown by the photograph Fig. 21 the probe was positioned 1 inch from the radiator. Measured coupling data are shown on Fig.'s 22 and 23. Frequency was swept from 2100 to 2300 MHz with 2106 and 2288 MHz measured by a Hewitt Packard Company frequency counter and spotted on the graphs.

6.3 GPS Antenna

6.3.1 The probe pickup was position in the same manner as provided for the Shaped Beam and Omni units. Separation distance was 1 inch. The measure data swept from 1200 to 1600 MHz are shown on Fig. 24. The two operational frequencies - 1228 and 1575 MHz - were measured and spotted on the graph.

6.4 X-Band Antenna

6.4.1 Two different probes were investigated. First, as shown on Fig. 24, the same spiral pickup used for the other antennas was placed in various positions in front of the feed; and then behind the feed. On Fig. 25 the spiral pickup probe is placed behind the feed and off-set to allow an inch clearance if the probe is pulled straight out parallel to the feed transmission line. The frequency was swept from 8100 to 8300 MHz and the measured data are shown on Fig. 26. Coupling at 8212 MHz was (-34 dB) as shown on the graph. This was considered low by the PSL cognizant engineer, and a second attempt was made to improve the coupling.

Figure 27 shows an open-ended waveguide used as the probe pickup. This unit was placed in various positions and the one shown produced the best result. The off-set is in the order of 1 inch as done with the spiral. The measure data are shown on Fig. 28. This probe provides close to (-24 dB) coupling. A phone call to the GE/SVD cognizatn engineer was made, these conditions were reported, but no further tests were required by GE.

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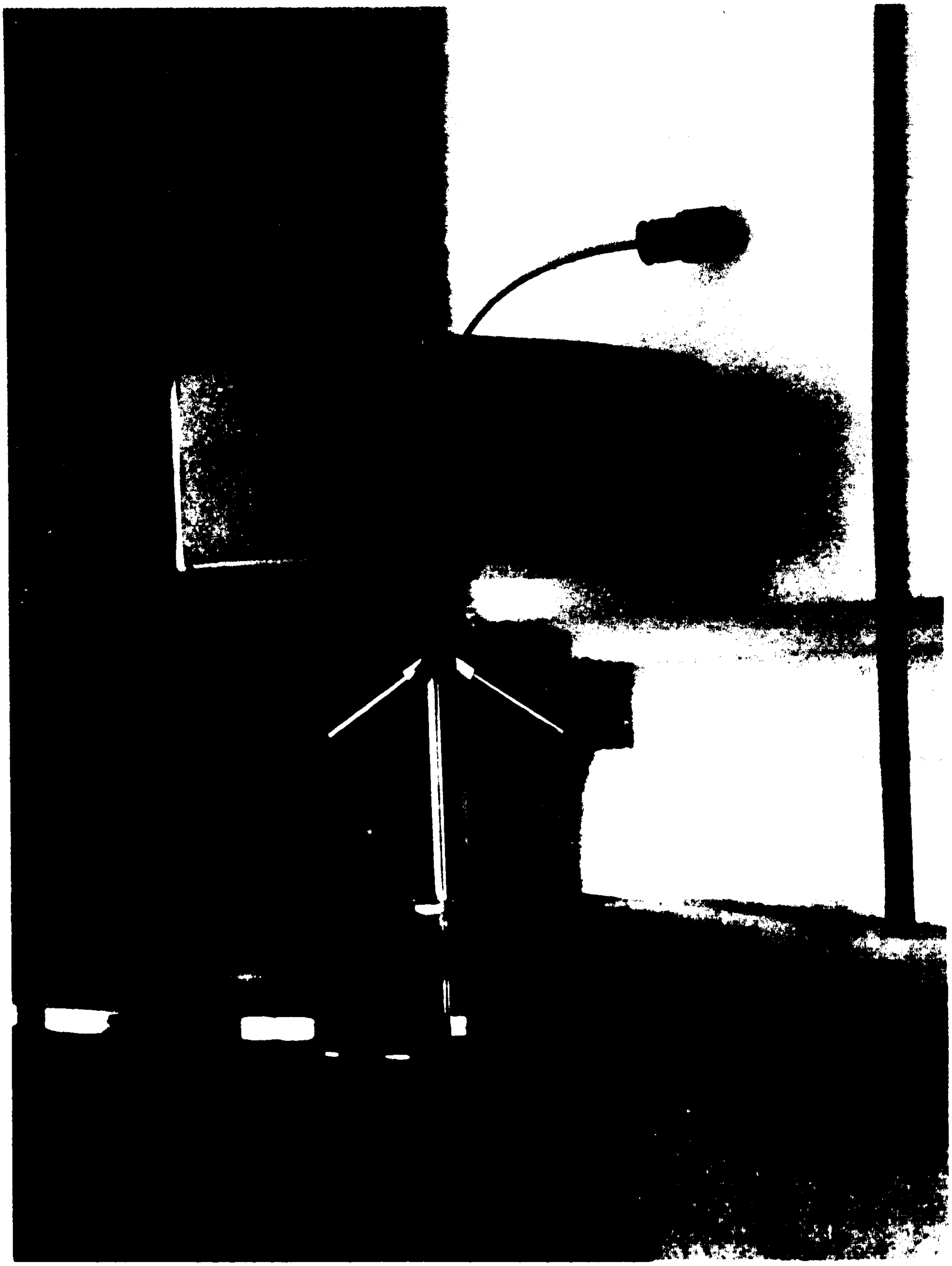

Fig. 18 - S-Band Shaped Beam With Pickup Probe

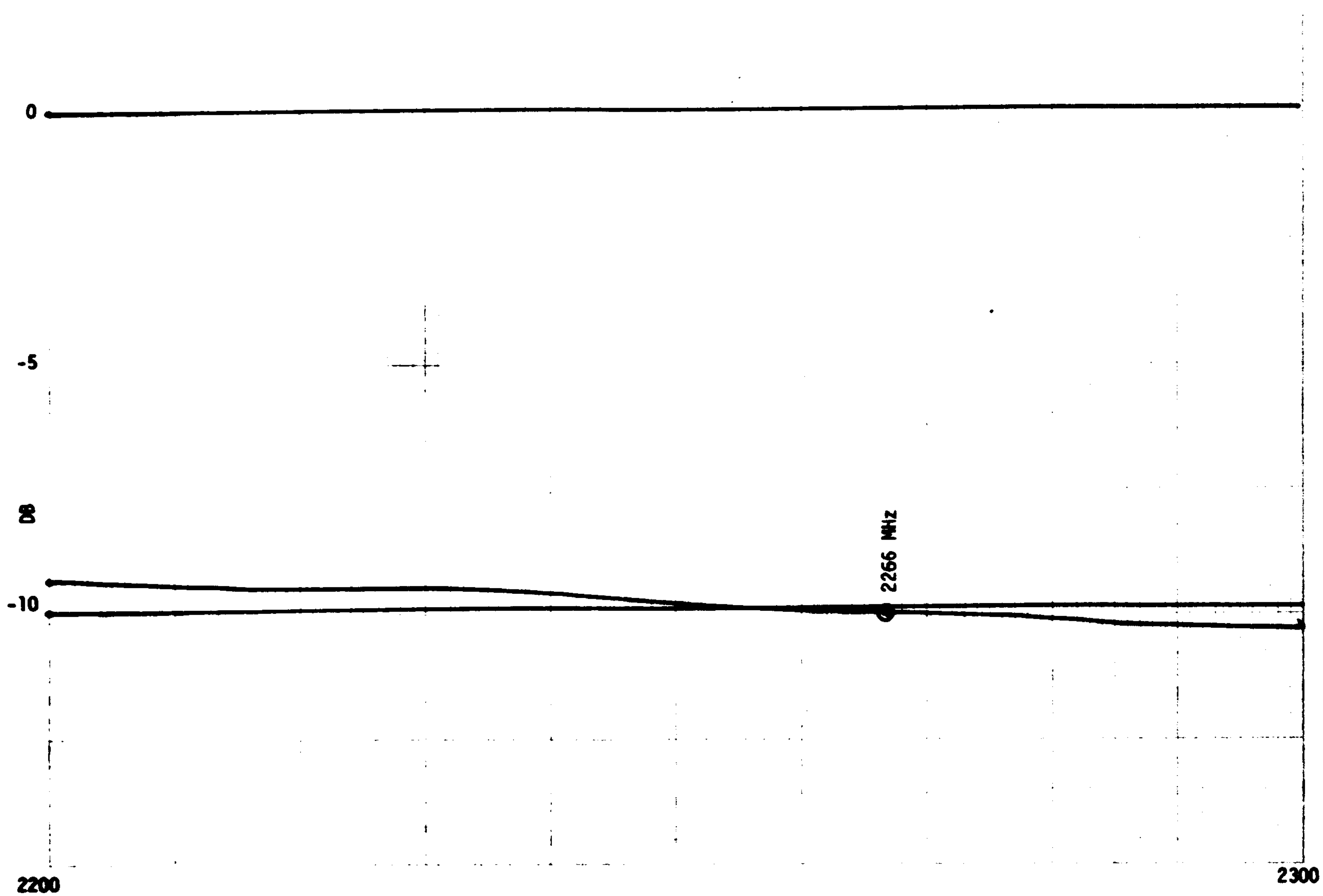

Fig. 19 - Coupling of S-Band Shaped Beam No. 1
To Launch Pickup Probe

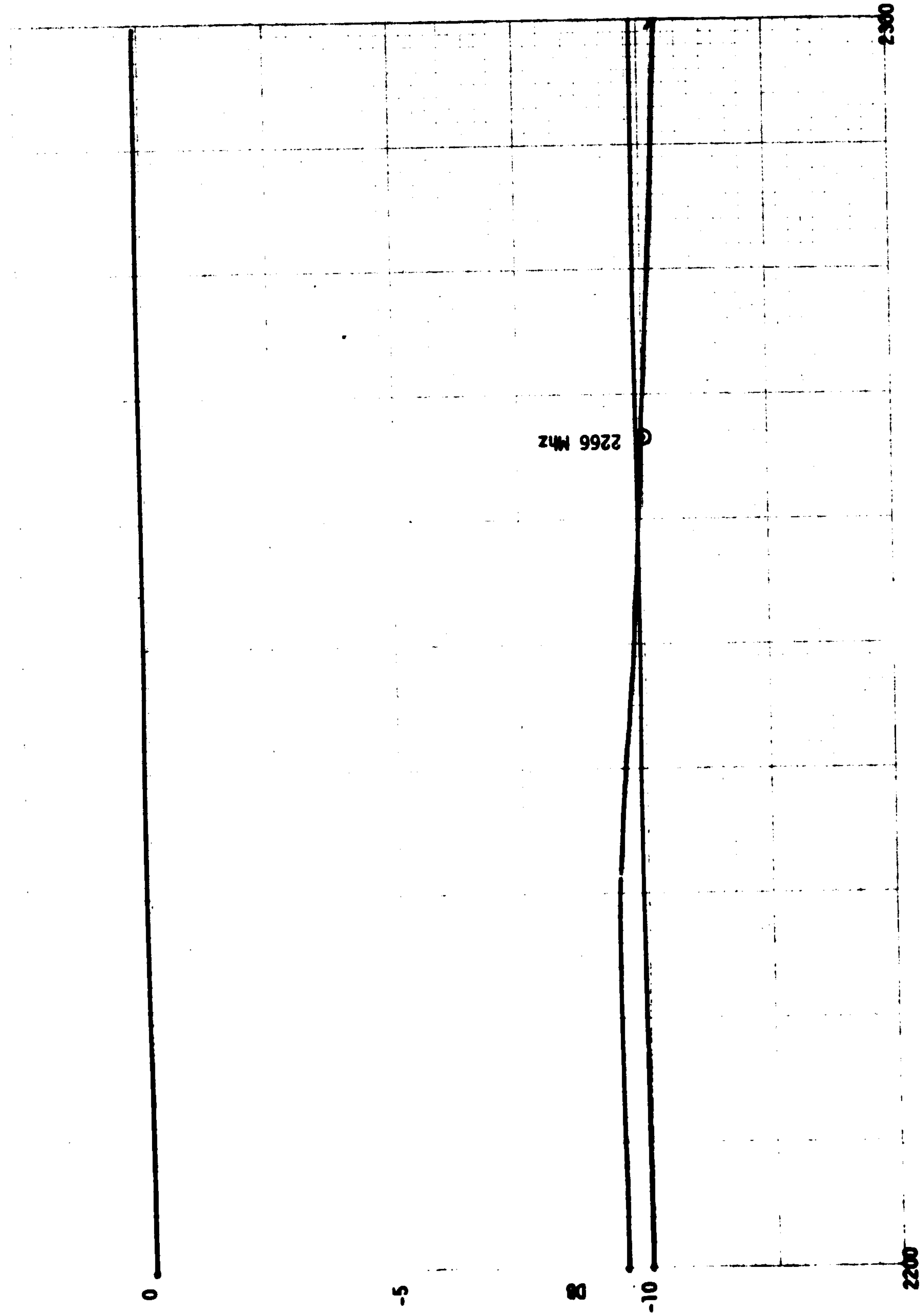

Fig. 20 - Coupling of S-Band Shaped Beam No. 2
To Launch Pickup Probe

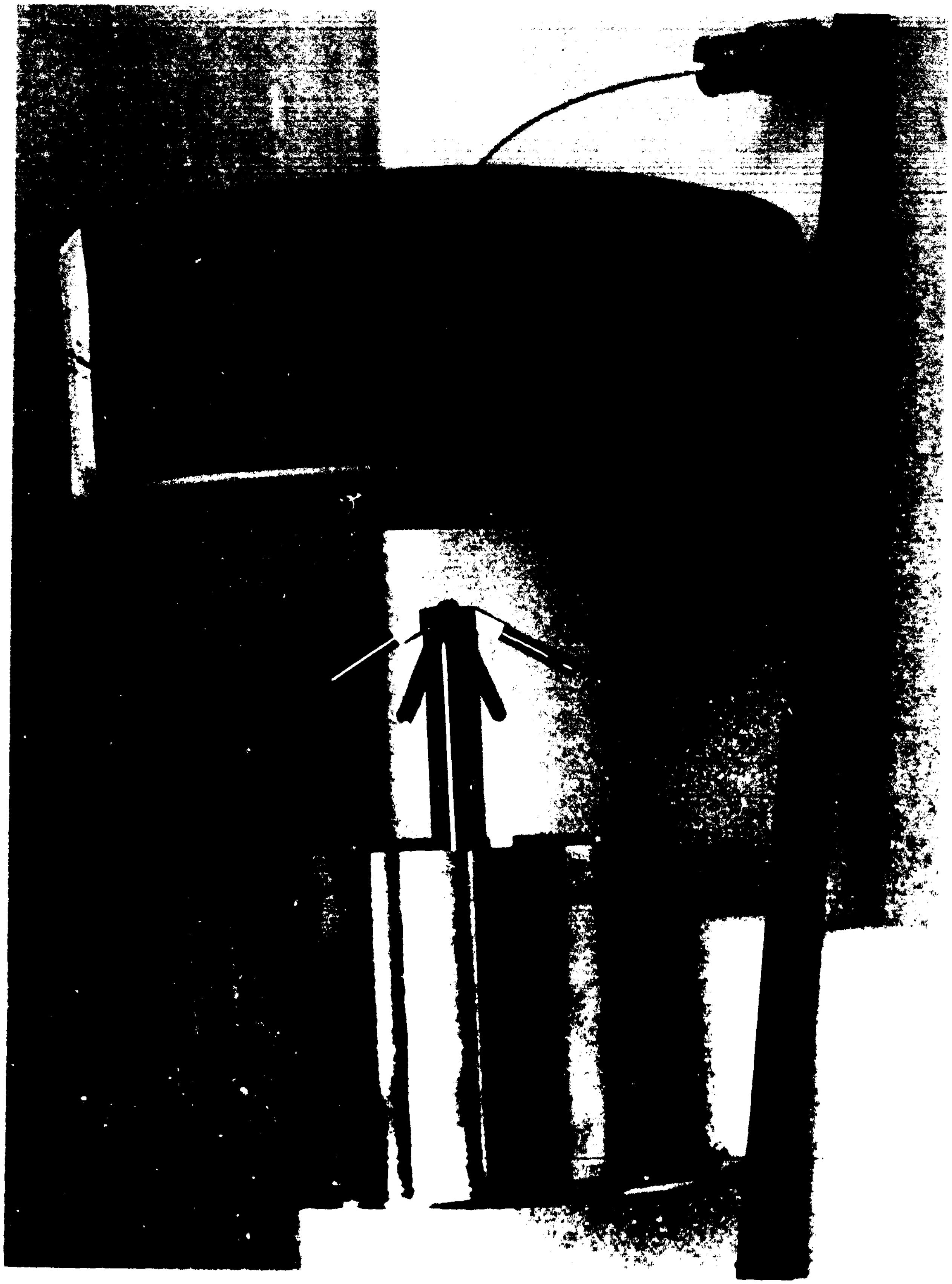

Fig. 21 - S-Band Omni Unit Antenna With Launch Probe

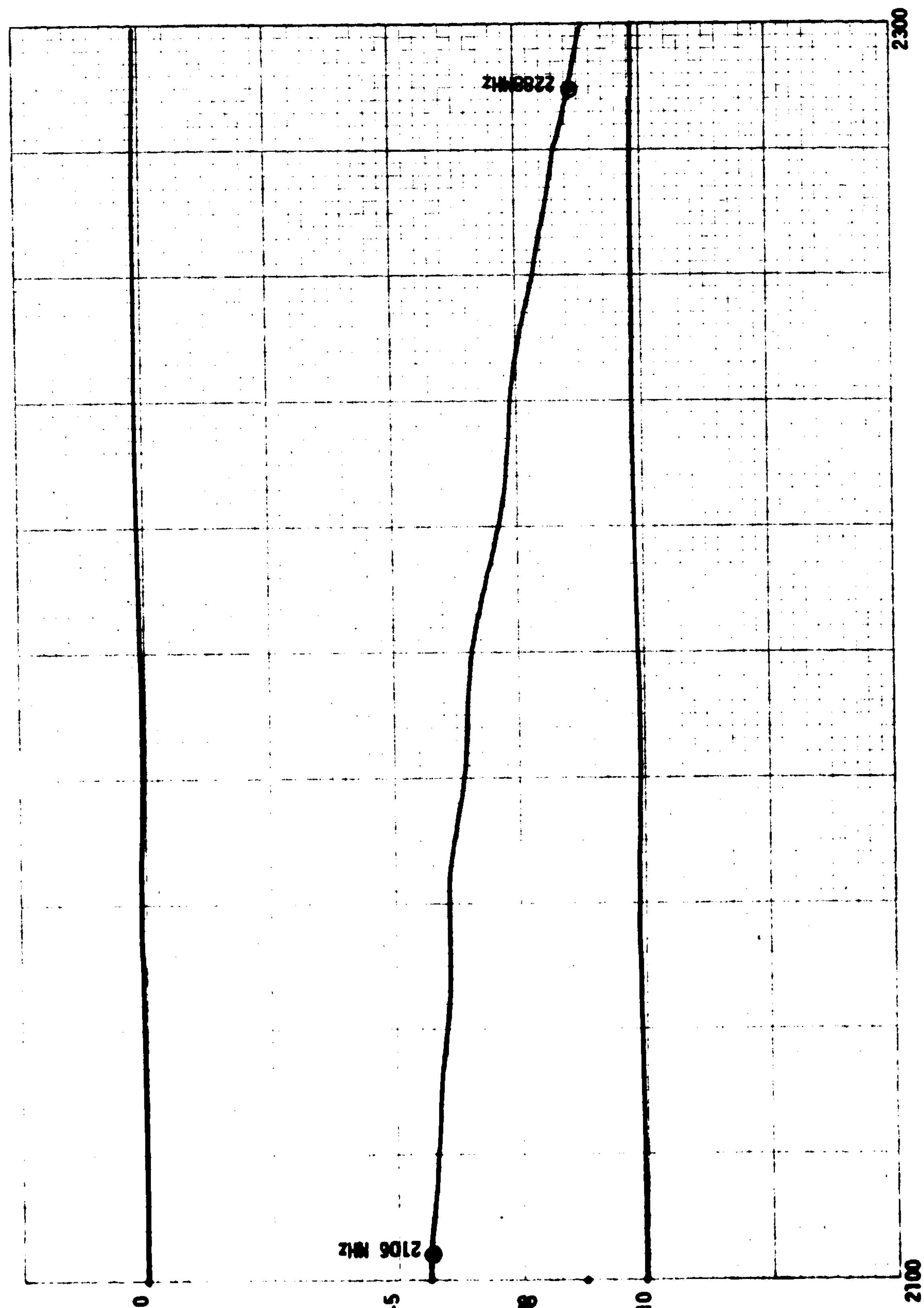

Fig. 22 - Coupling of Omni No. 1 to Launch Probe

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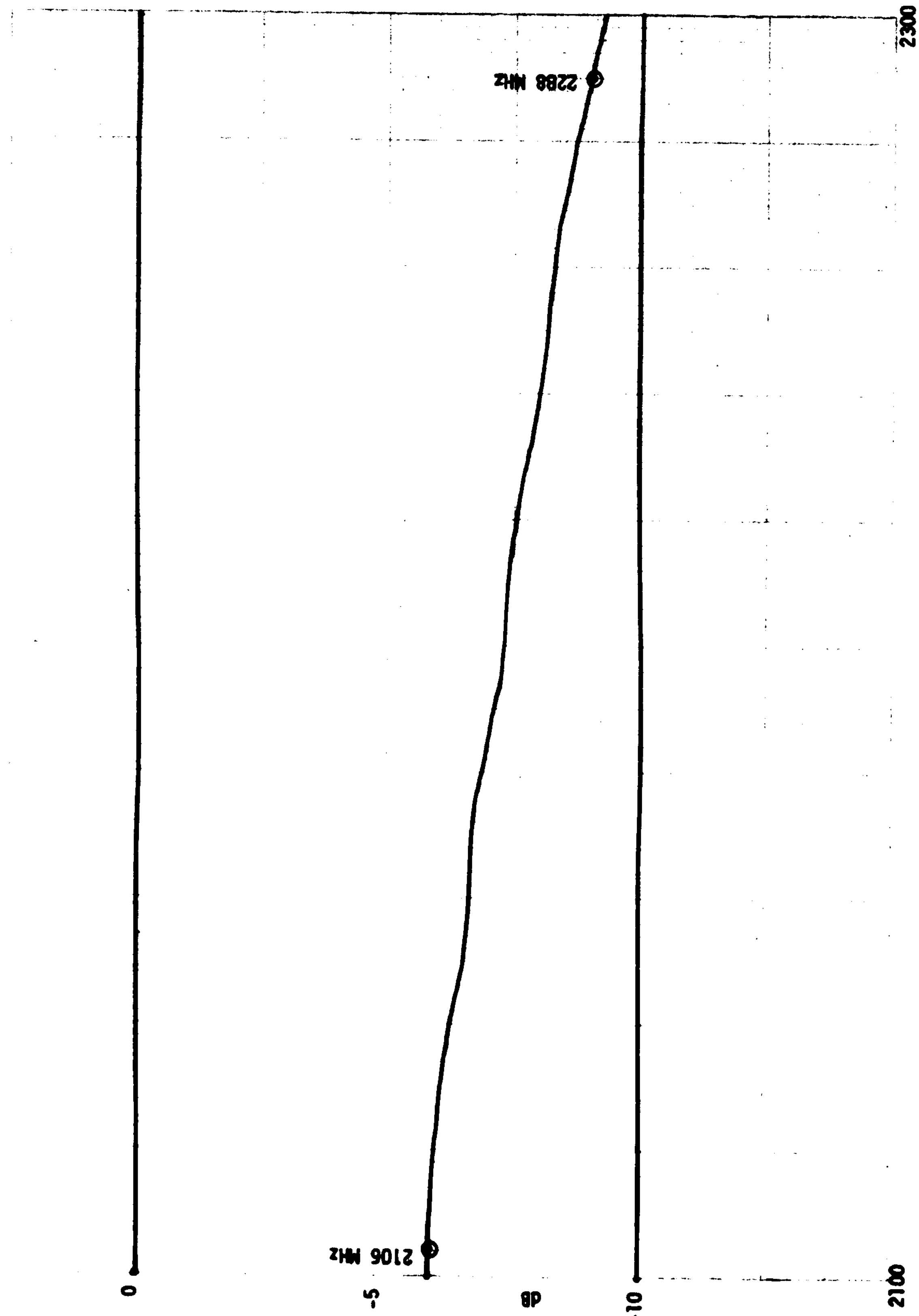

Fig. 23 - Coupling of Omni No. 2 to Launch Pickup

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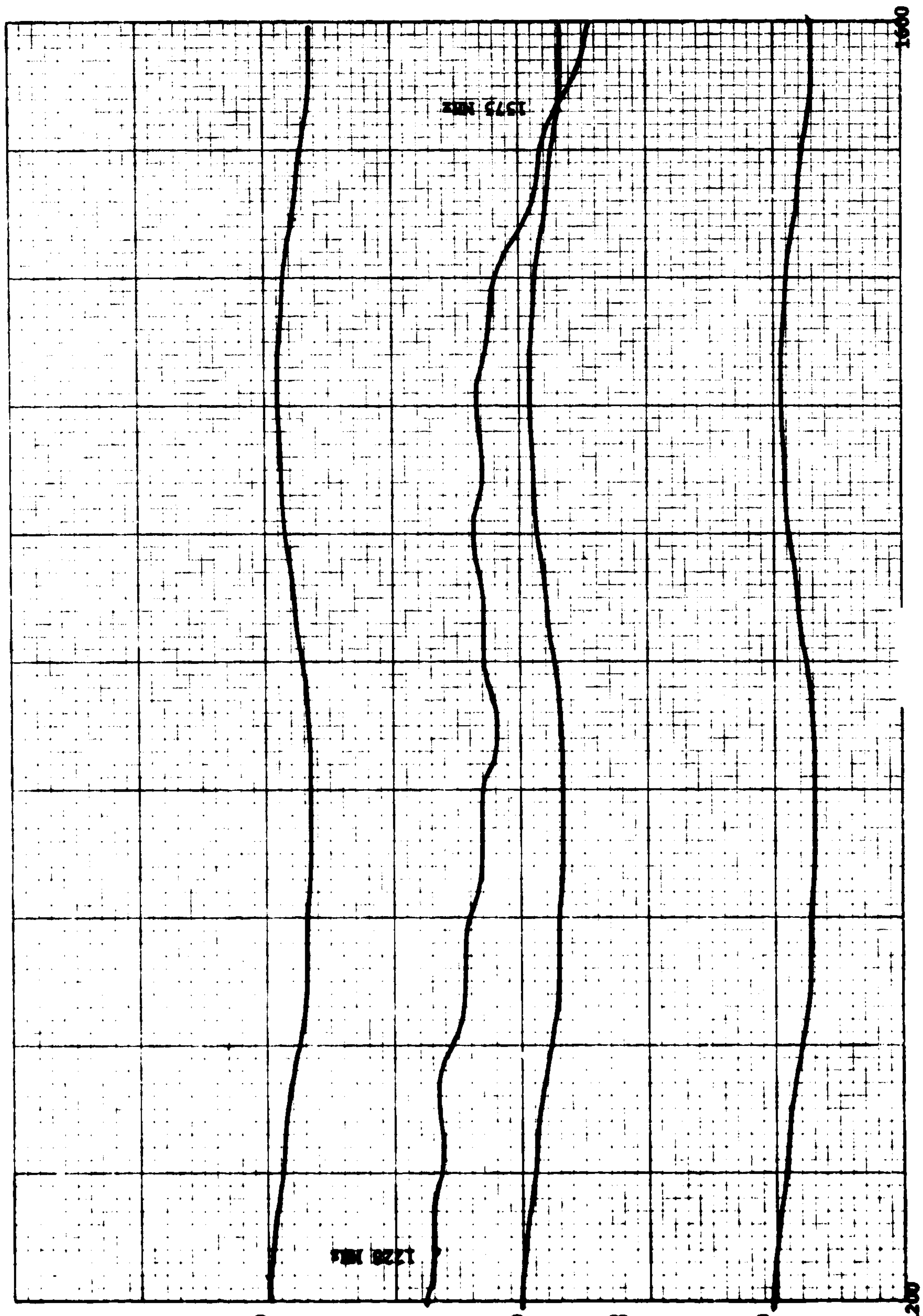


Fig. 24 - Coupling of GPS Antenna to Luanch Pickup

Fig. 25 - X-Band Shaped Beam Antenna With Spiral Pickup

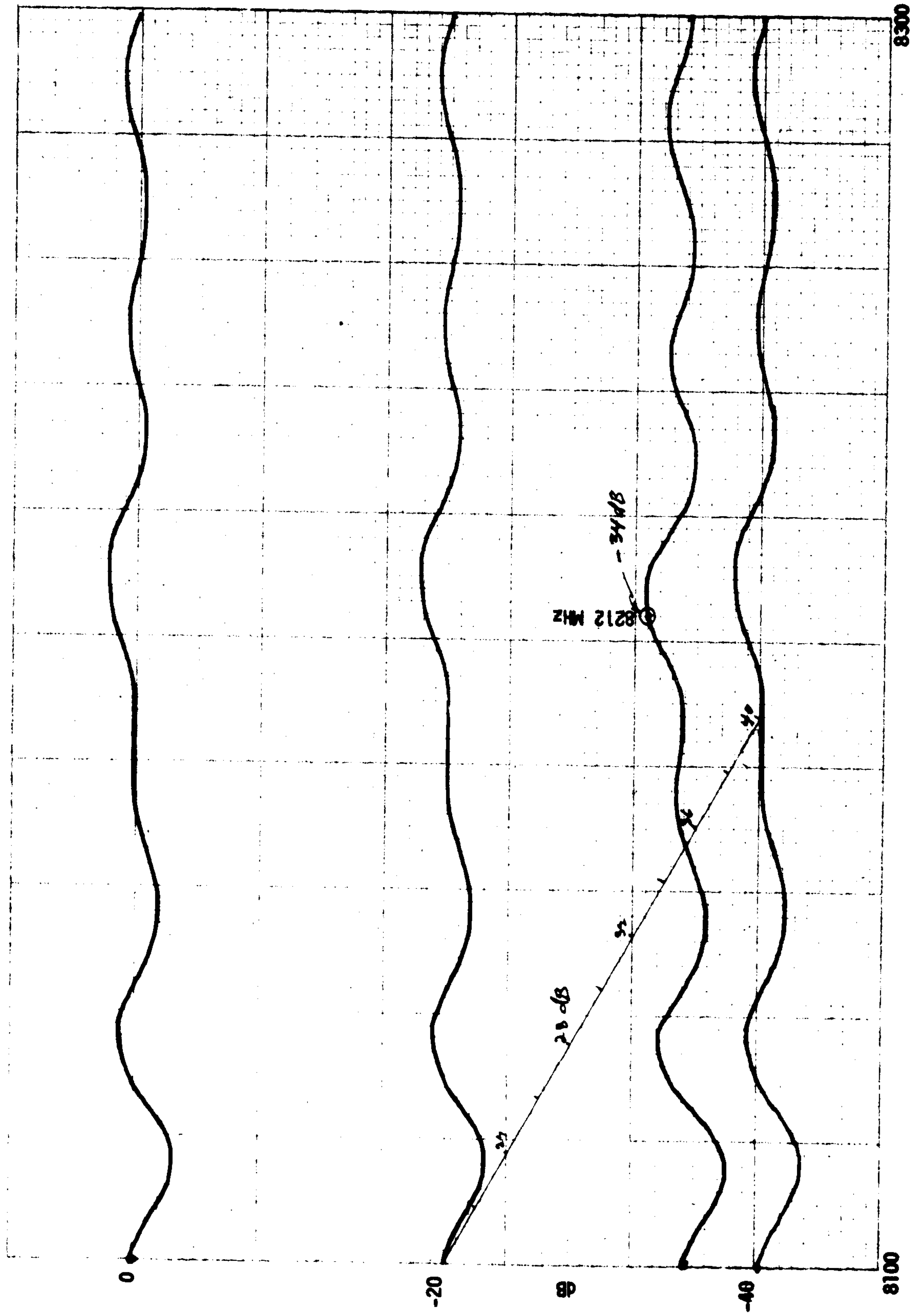


Fig. 26 - Coupling of X-Band Shaped Beam Antenna to Launch Pickup

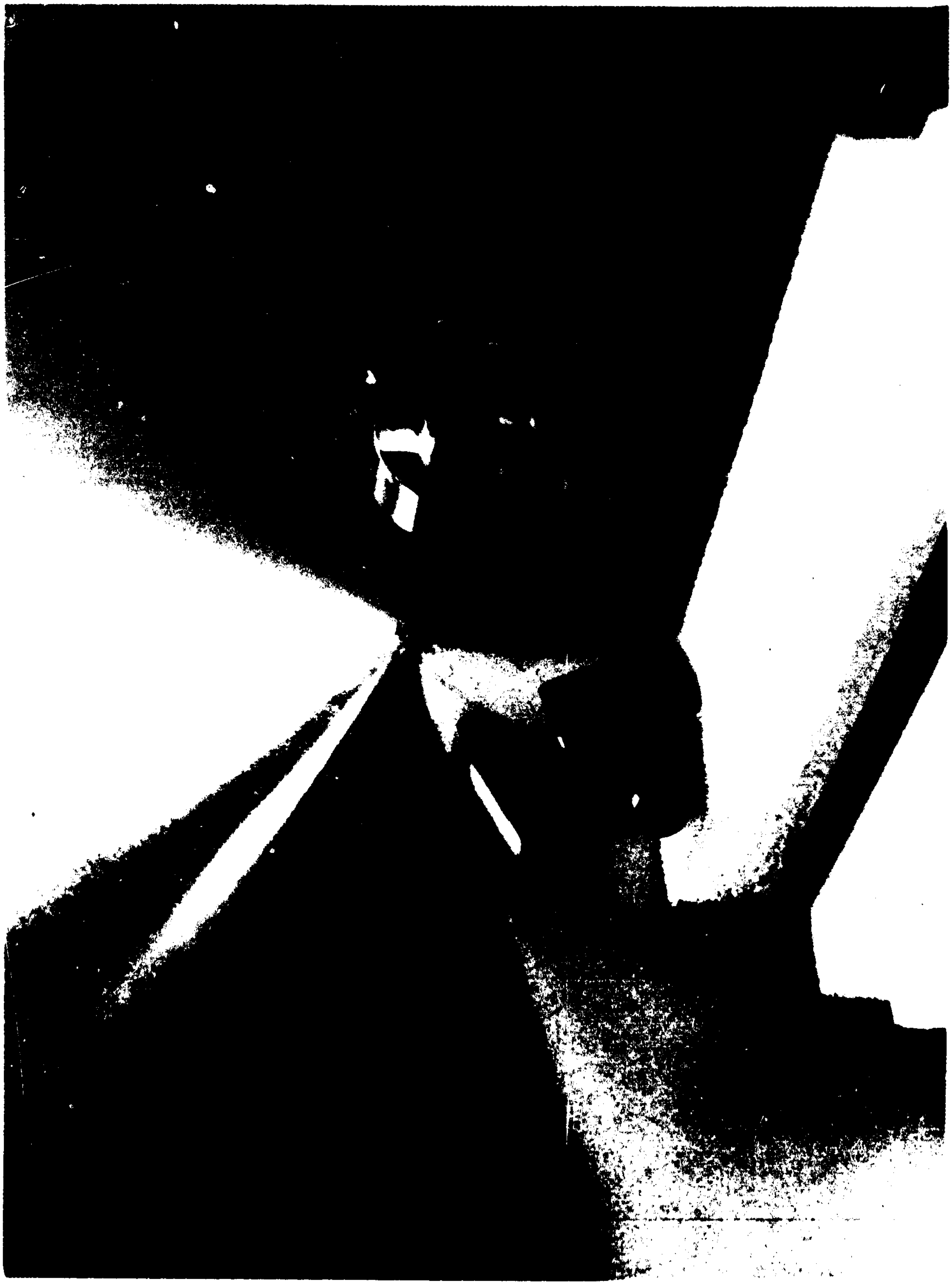


Fig. 27 - X-Band Shaped Beam With Open-Ended Waveguide Pickup

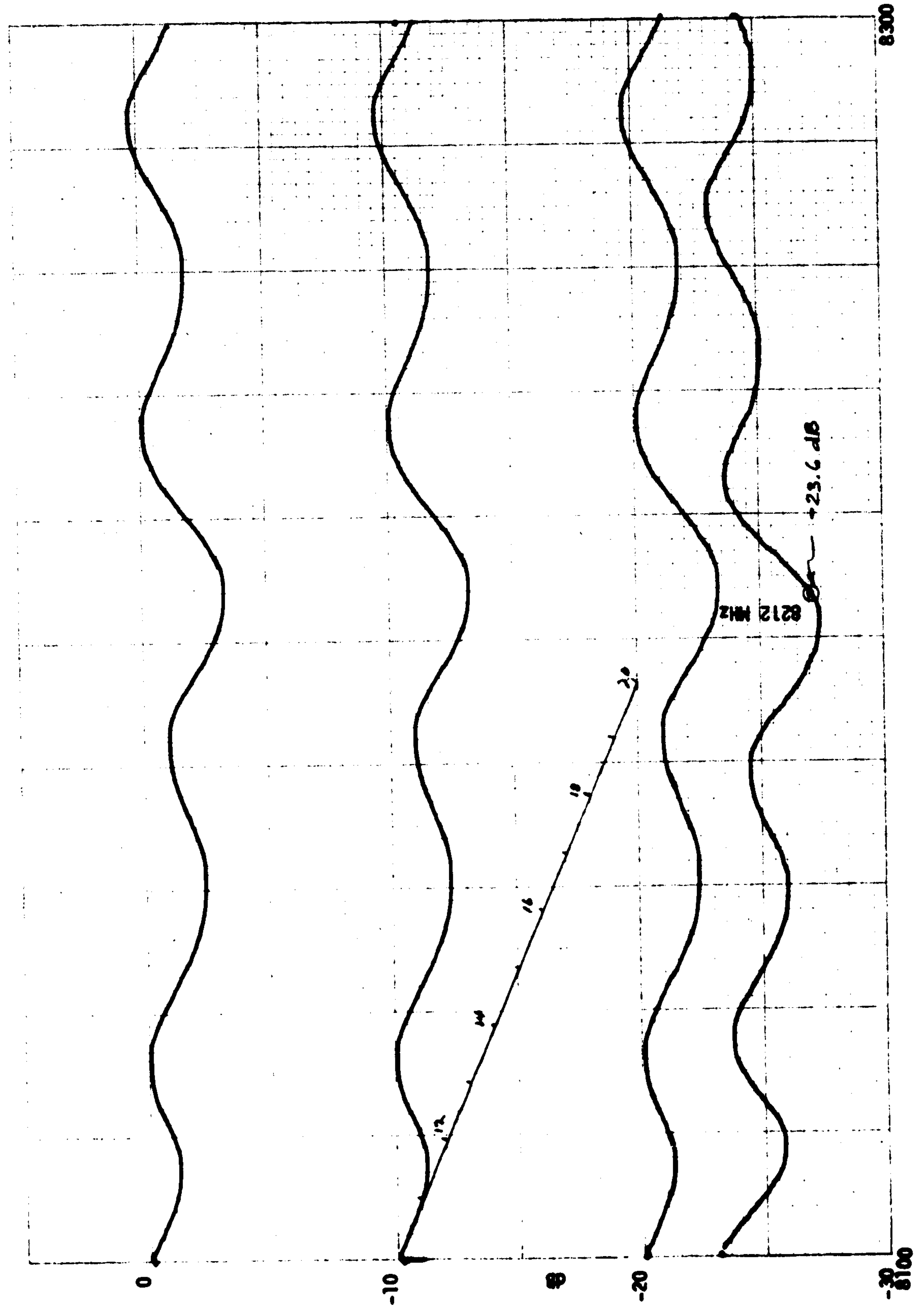


Fig. 28 - Coupling of X-Band Shaped Beam Antenna
To Launch Pickup - Open-Ended Waveguide

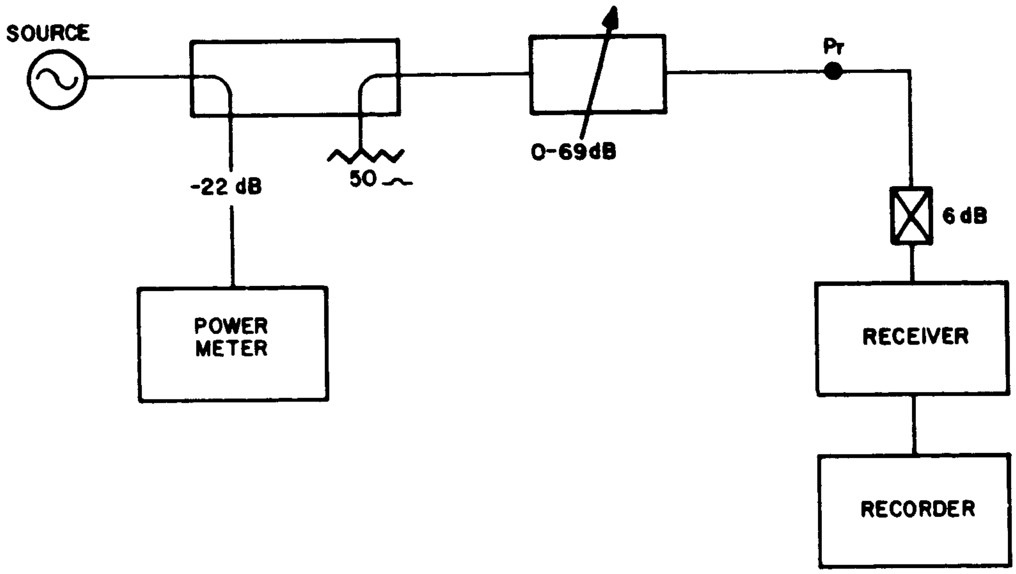
7.0 ELECTROMAGNETIC INTERFERENCE FIELD STRENGTH MEASUREMENTS

7.1 Equipment Setup

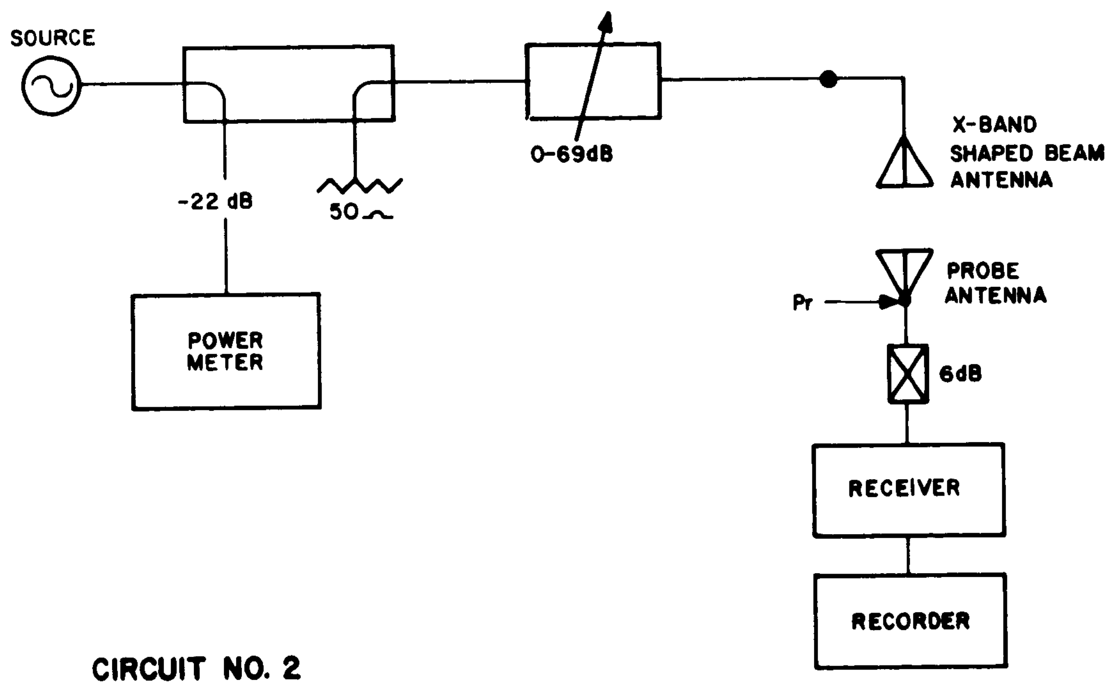
7.1.1 The test setup is shown on the block diagram Fig. 29. Circuit No. 1 shows how the equipment was connected for calibration, and No. 2 shows the calibrated system connected for tests to proceed.

7.1.2 There are various methods for determining the field produced by a given antenna as a source; and a local field may be measured without any knowledge of the source producing its one method, and variations of the method, is described in the Military Standard MIL-STD-462; but the required measurements for the Landsat-D case do not fit well with these specifications. Also, the National Bureau of Standards uses techniques for measuring field strength which might be applied to the Landsat-D measurement requirement. The method described following these notes (under procedure) can be used to determine the antenna factor stated in the MIL specifications, but the procedure used is straight forward, with the exception that, for any of the measurement methods, the requirement to measure the field not in true free-space increases possible error in the results. The requirement that the field be measured close to the metal skin of the test vehicle makes it difficult to use free-space gain information about the test probes - or receiving - antennas. Reflections and scattering from the test vehicle skin can modify the incident field making measured values appear either higher or lower than the actual incident field.

For the measurements performed standard gain horn antennas were used as probes.



CALIBRATION CIRCUIT NO. 1



CIRCUIT NO. 2

Fig. 20 - Block Diagram of Equipment Used
To Measure Field Strength

7.2 Procedure:

7.2.1 Set up the source and measure the source power by the power meter in Circuit 1.

7.2.2 Adjust the (0-69 dB) attenuator to provide a 0 dB level on the reciever/ recorder.

7.2.3 Check the linearity of the receiver/recorder with the system at this gain level.

7.2.4 This process establishes a known power input to the point shown as Pr, or the poiwer input represented by 0 dB is known(where the circuit is impedance matched).

7.2.5 Go to Circuit 2.

Increase the power input to the transmitting antenna by adjusting the (0-69 dB) attenuator until a level at the recorder can be recorded relative to 0 dB. Then:

$$P_r = \frac{P_T G_T}{4\pi R^2} A_e = SA_e \ ;$$

S = Power flux density at the Probe In Watts/meter squared.

A_e = Effective area of the probe antenna in meters squared.

$$A_e = \frac{G_r \lambda^2}{4\pi}$$

Therefore:

$$P_r = \frac{S \ G_r \lambda^2}{4\pi} \ .$$

(P_r) is known from the recorded signal relative to 0 dB; where the 0 dB power level was established in Step 1.

(G_r) must be known,

(λ) is measured and known.

And rearranging;

$$S = \frac{4\pi \ P_r}{G_r \ \lambda^2} \text{ watts/m, or}$$

$$S = \frac{|E|^2}{Z_o} \ ; \ Z_o = 377 \text{ ohms}$$

$$E = \sqrt{SZ_o} \text{ volts/m.}$$

Finally: the chosen probe was linearly polarized.

P_{rh} was recorded for a horizontal component of polarization; and

P_{rv} was recorded for a vertical component of polarization.

The two linear components of power (not dB) can be added to give the total power.

7.3 Results of EMI Field Measurements

7.3.1 A layout of the MSS, thematic mapper, and antennas to show relative positions is presented on Fig. 30. This sketch is not to scale. Plus Z-axis is out of the page.

Each position is defined. The data are presented on Fig.'s 31 through 36.

7.3.2 Measurements were made at the scanner aperture of the MSS and the thematic mapper systems, but not inside the opening.

7.3.3 A measurement was taken near the mockup surface of the motor module with the probe antenna in the same plane as the edge of the X-Band ground plane. The measured field was 58 v/m with 44 watts input to the X-Band antenna.

The position is shown on Fig. 36.

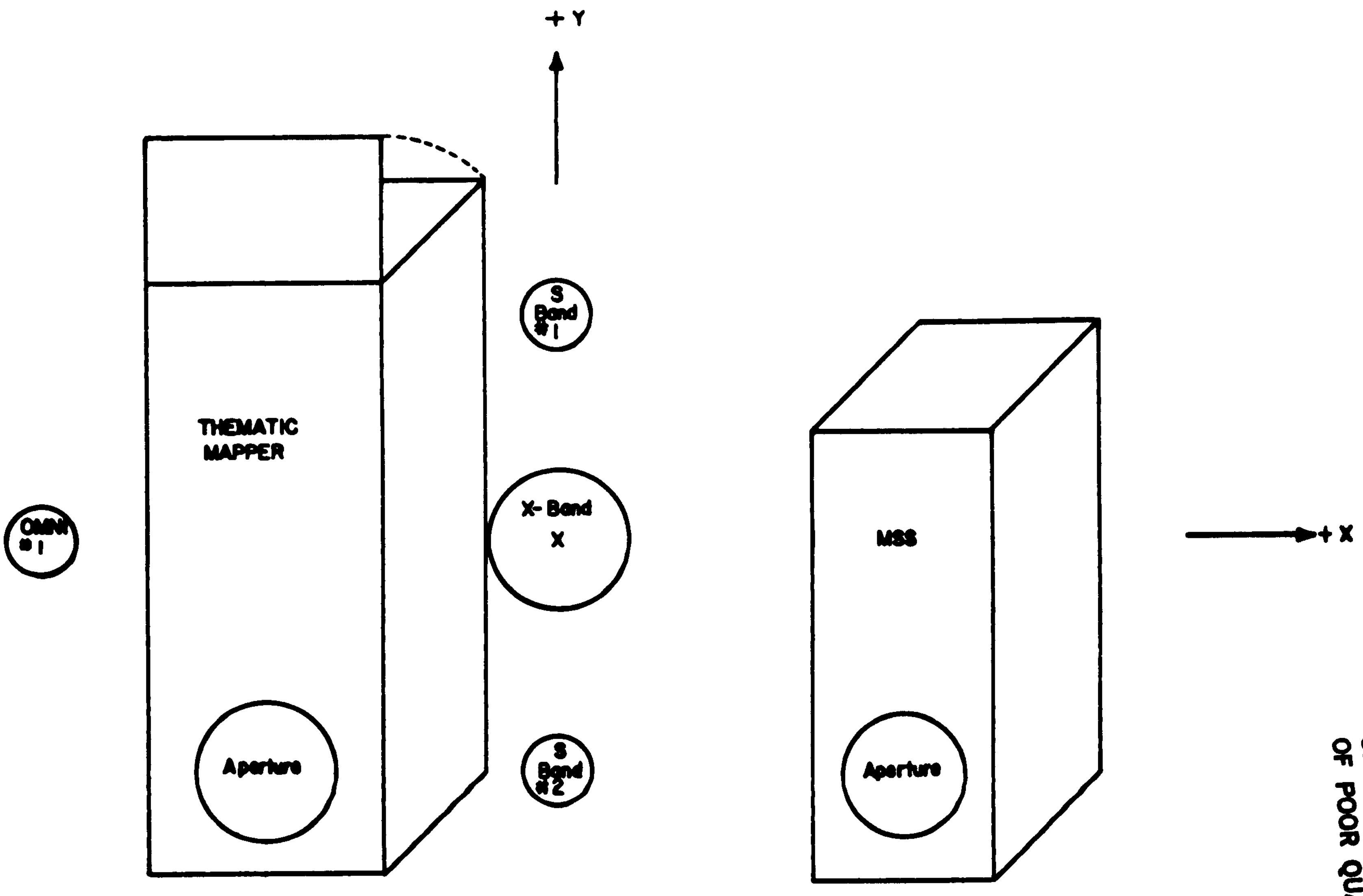
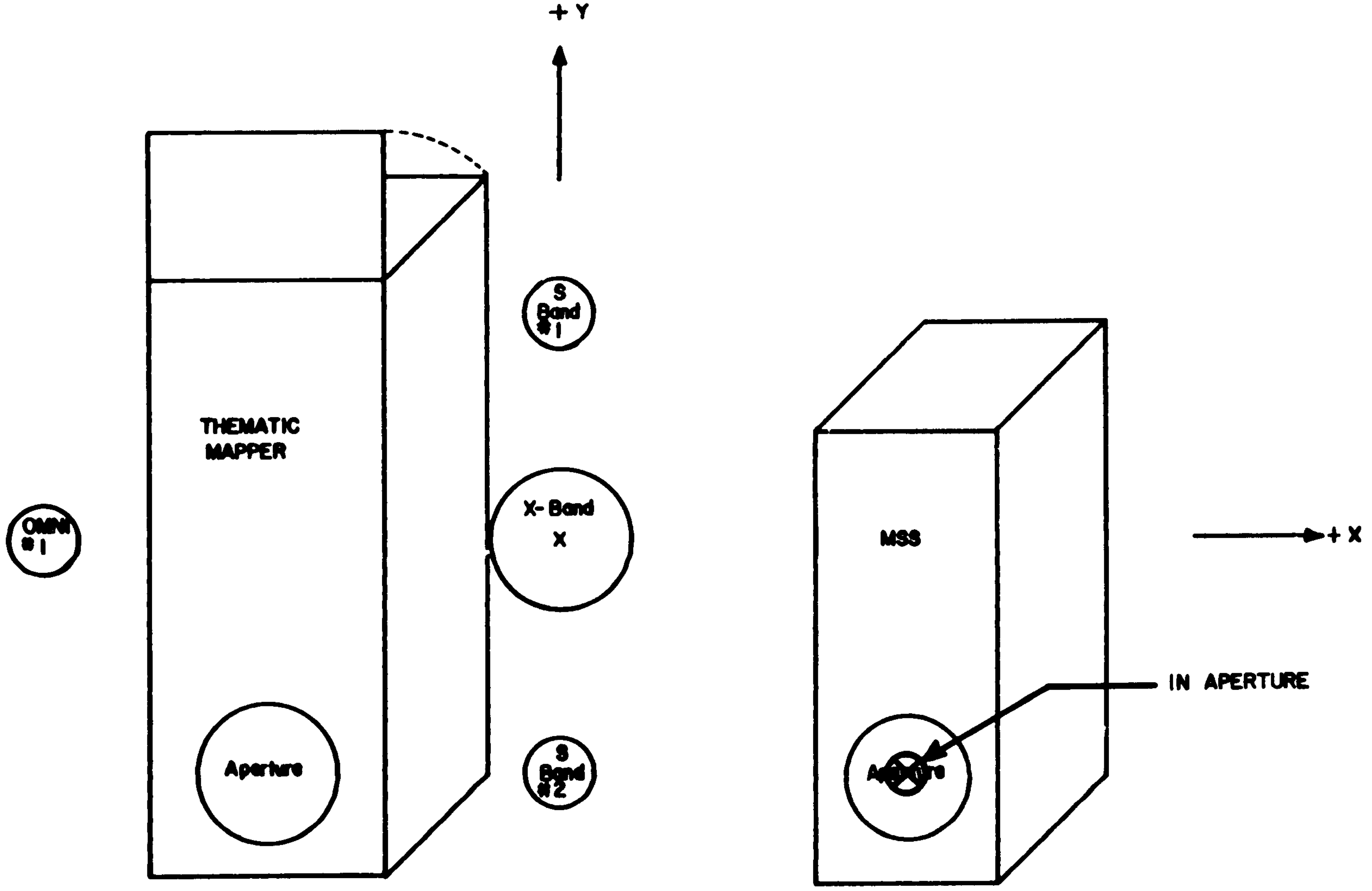


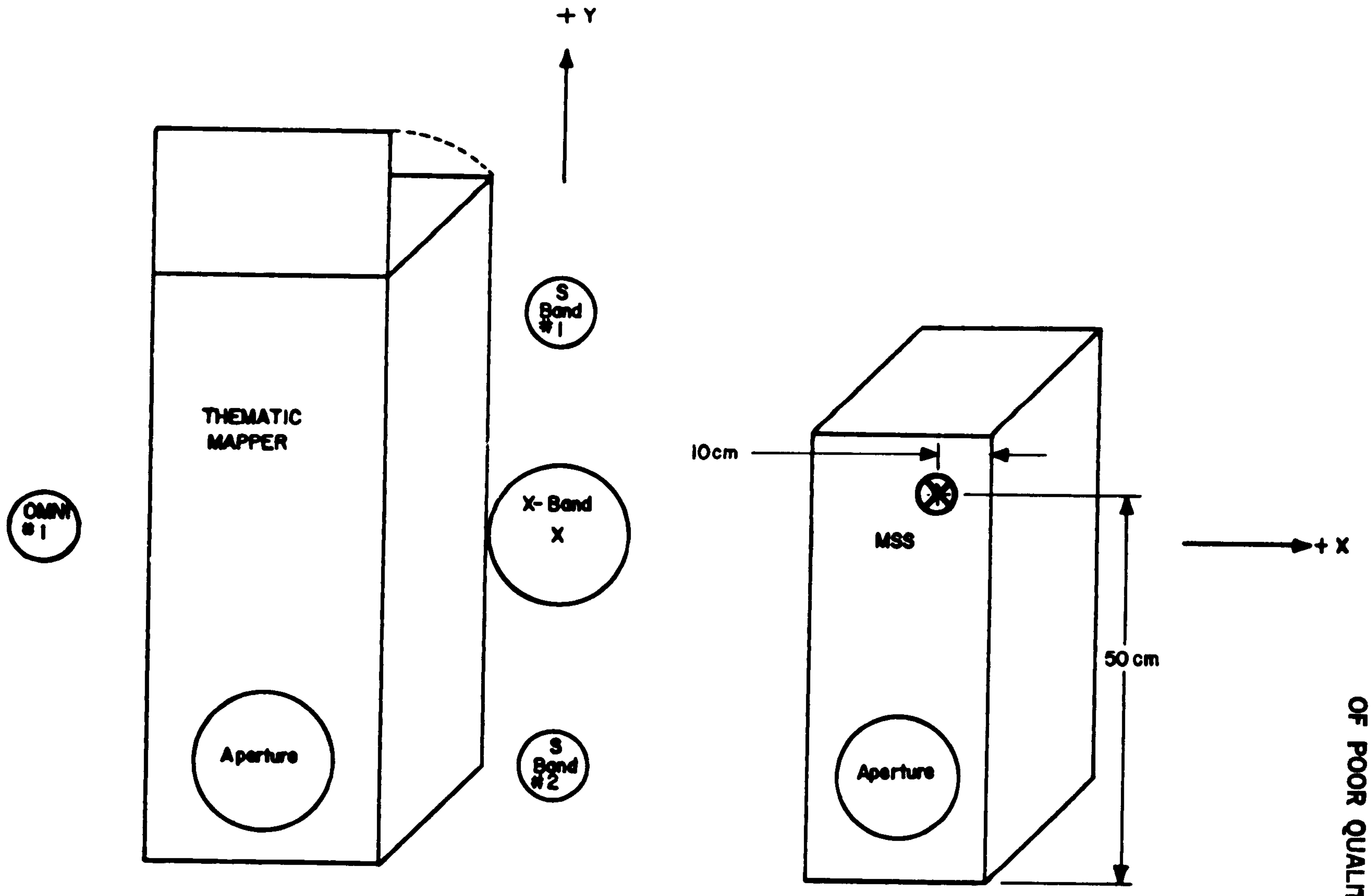
Fig. 30 - General Layout of Sensors and Antennas
(Not to scale)



2 watts in

S-Band No. 1 =
S-Band No. 2 = 8 v/m
Omni No. 1 = 4.3 v/m @ 2288 MHz
= 11 v/m @ 2106 MHz
X-Band @ 44 watts = 9 v/m

Fig. 31 - Position No. 1 - EMI Field Strength Measurement



X-Band = 6 v/m

Fig. 32 - Position No. 2 - EMI Field Strength Measurement

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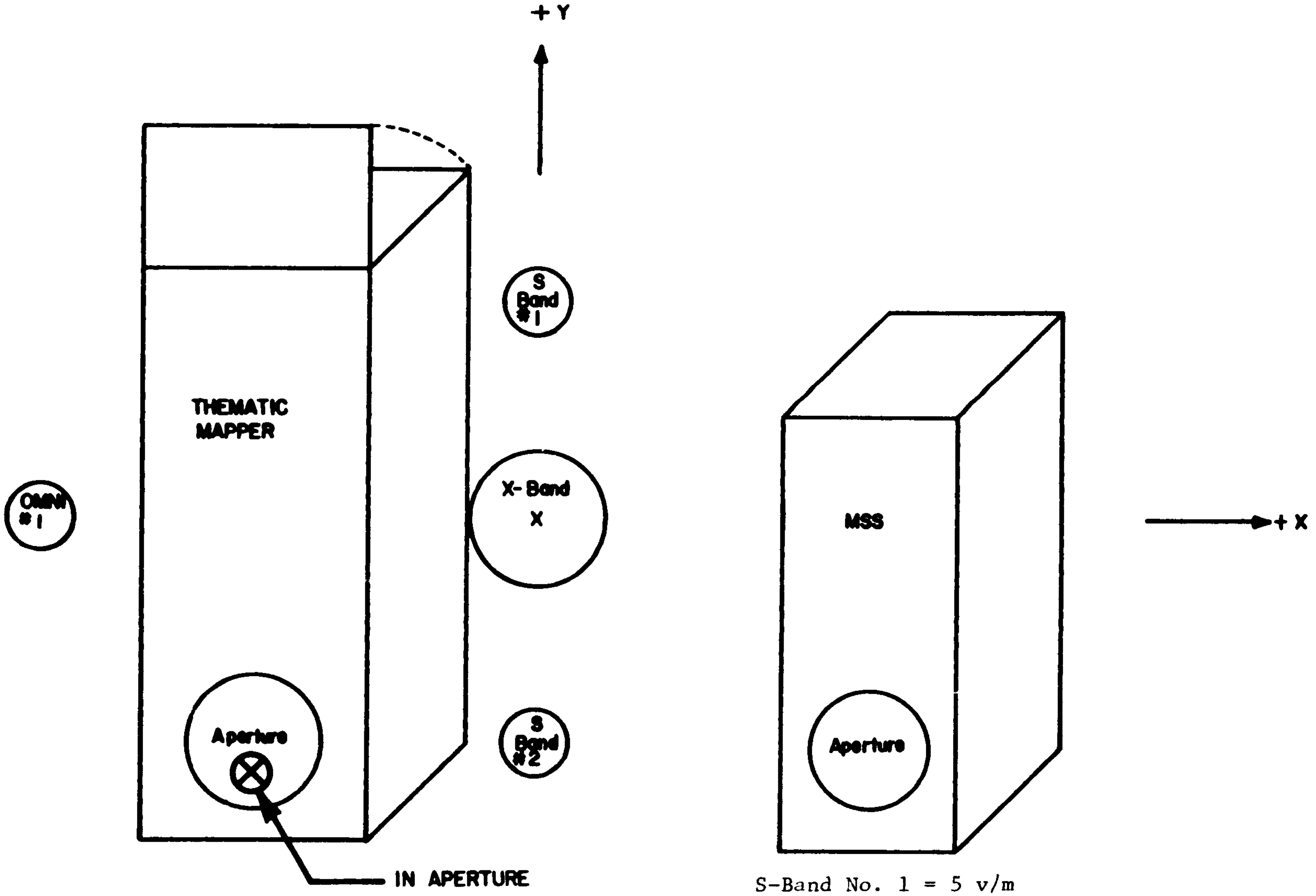

Assume Power to S-Band 1 and 2 = 2 watts
Assume Power to Omni No. 1 = 2 watts
Assume Power to X-Band = 44 watts

S-Band No. 1 = 5 v/m
S-Band No. 2 = 27 v/m
Omni No. 1 = 2288 MHz = 20.23 v/m
= 2106 MHz = 15 v/m
X-Band = 12 v/m

Fig. 33 - Position No. 4 - EMI Field Strength Measurement

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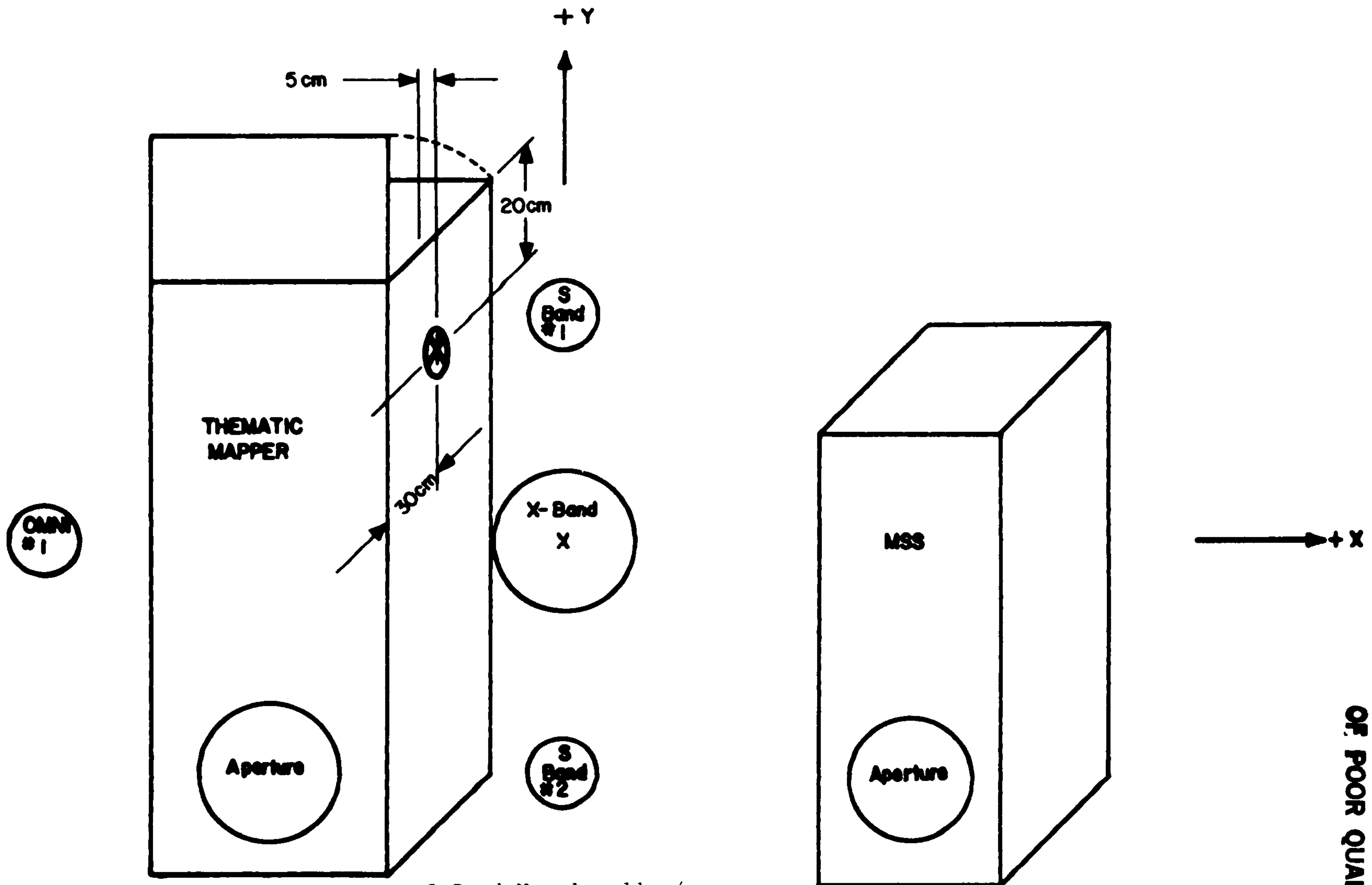
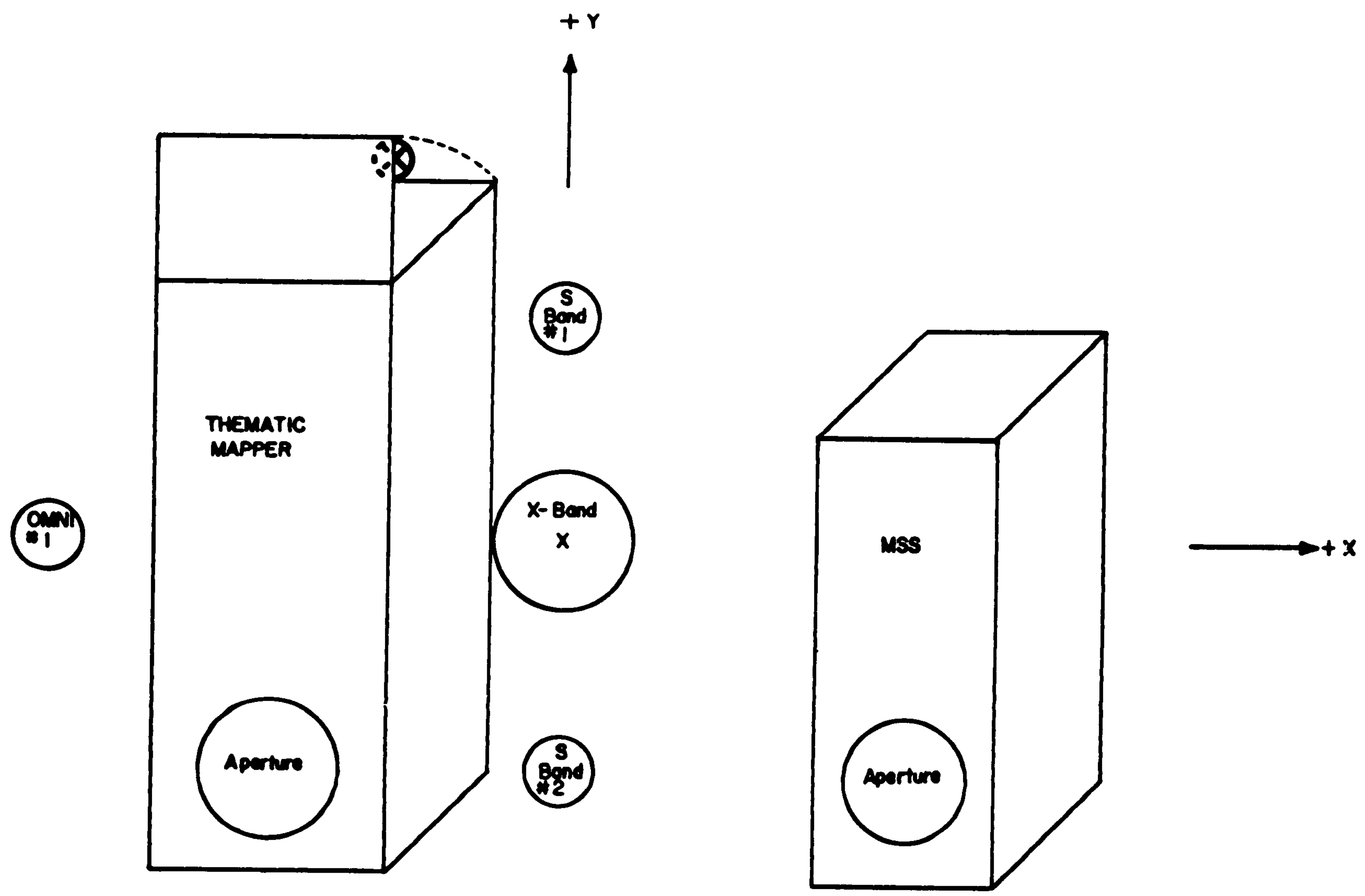


S-Band No. 1 - 11 v/m
S-Band No. 2 = 1.0 v/m
Omni No. 1 = 2106 MHz = 3 v/m
= 2283 MHz = 3 v/m
X-Band @ 44 watts = 7 v/m

Fig. 34 - Position No. 7 - EMI Field Strength Measurement



S-Band No. 1 = 4.5 v/m
S-Band No. 2 = 3 v/m
Omni No. 1 = 2288 MHz = 6.5 v/m
= 2106 MHz = 9 v/m
X-Band @ 44 watts = 6 v/m

Fig. 35 - Position No. 8 - EMI Field Strength Measurement

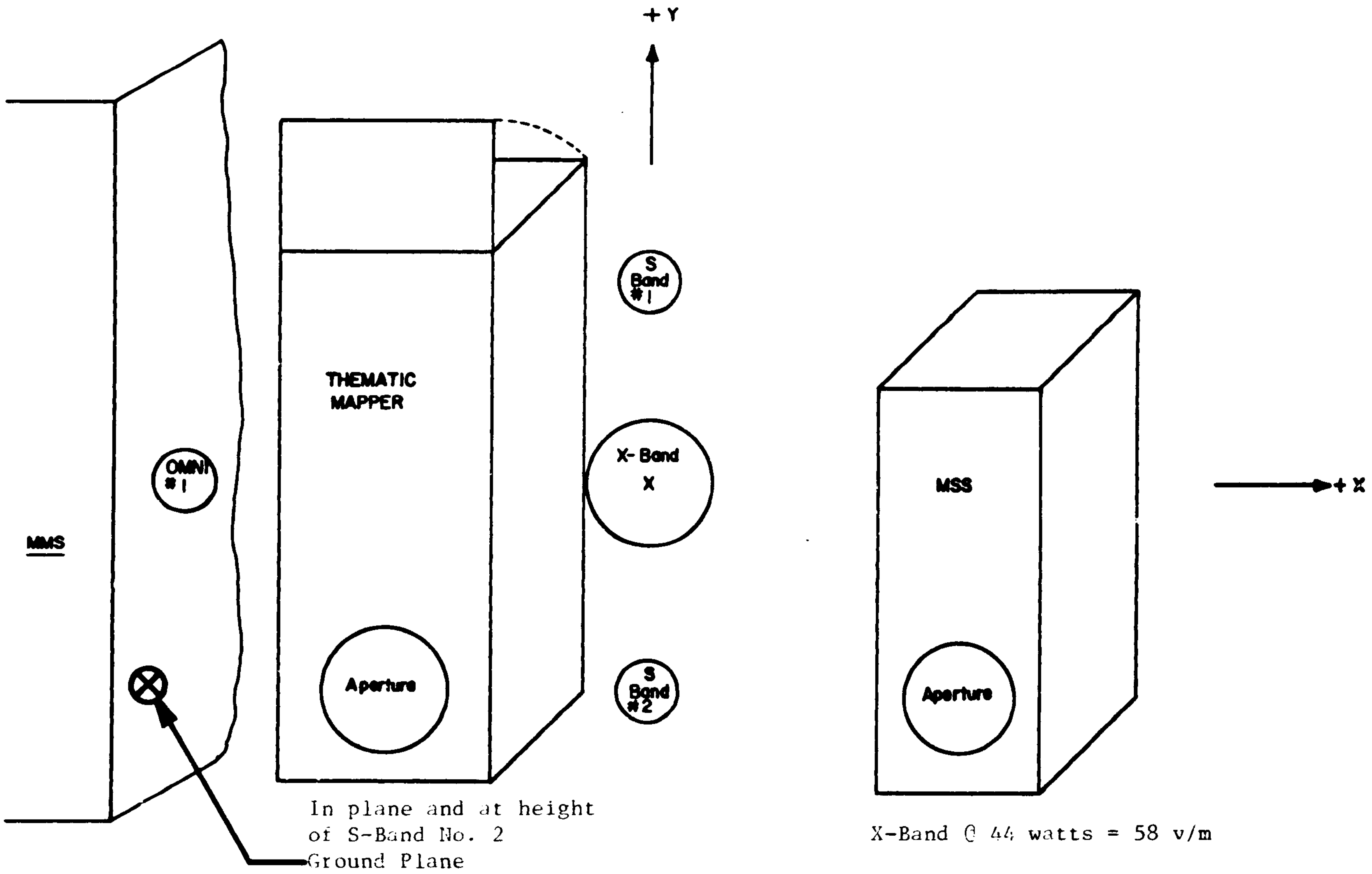


Fig. 36 - Position No. 9 - EMI Field Strength Measurement

8.0 SIMULATED SHROUD ANTENNA PATTERNS AND GAIN MEASUREMENTS

8.1 Mechanical

8.1.1 Figure 37 is a sketch to show the simulation constructed at the PSL shop from dimensions provided by the GE/SVD cognizant engineer. The photograph Fig. 38 shows the completed mockup.

8.1.2 Care should be excercised in interpreting the antenna patterns and gain obtained because both are very sensitive to the mockup shape, and to items inside the mockup. If in the flight model case the shroud is a tightly sealed space to r.f. energy, this approach will probably work as well as indicated by these data. Experience with former vehicles (NIMBUS-A) attempting this kind of pre-launch r.f. radiation through an opening was not very successful where the thermal blanket was not a very good r.f. seal.

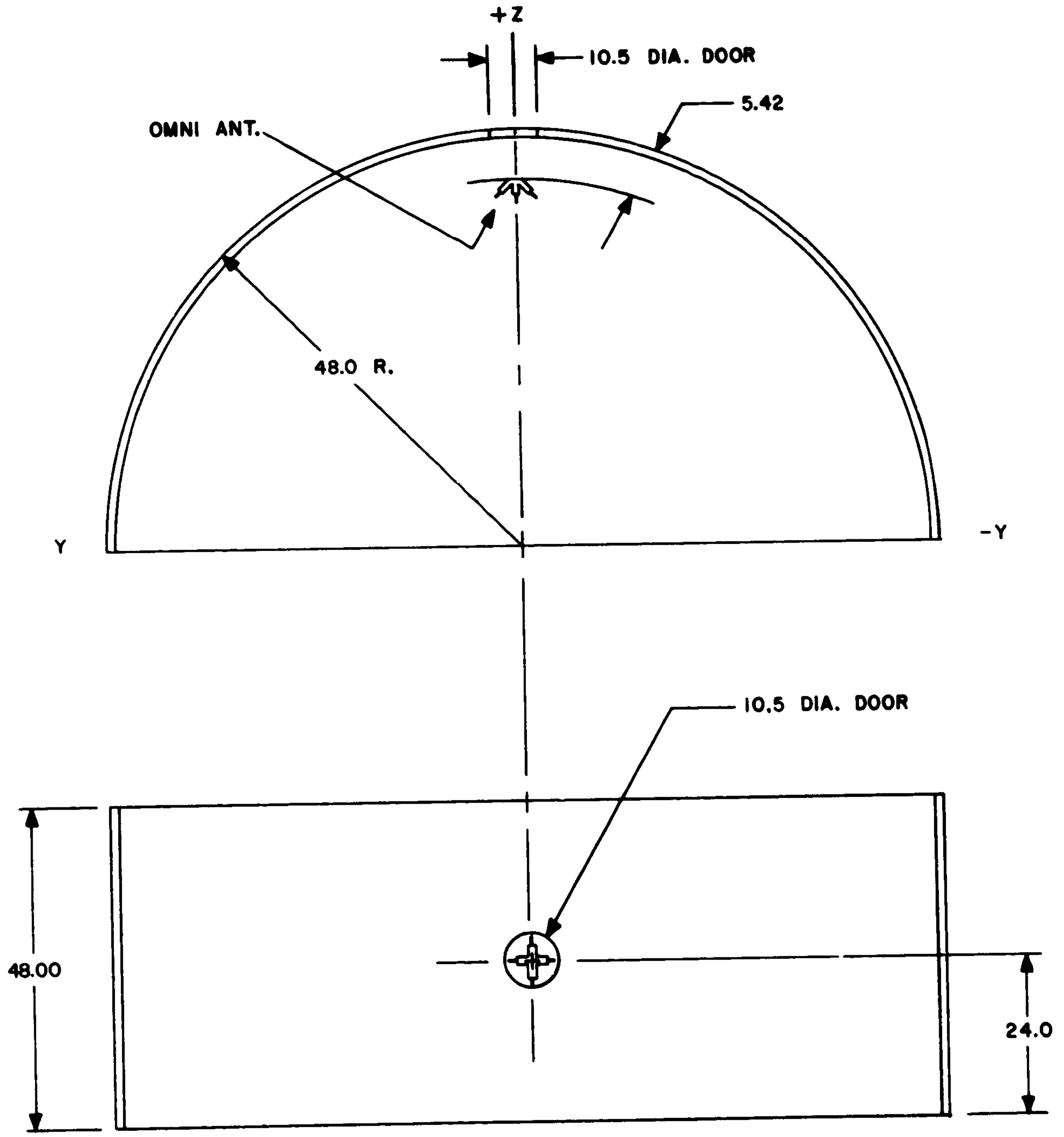


Fig. 37 - Dimensions For Simulated Shroud

Fig. 38 - Simulated Shroud Mockup

8.2 Simulated Shroud Antenna Measurements

8.2.1 S-Band Omni unit radiator
2287.5 MHz
R.C. Polarization
Survey Data

8.2.2 Gain = +5 dBi at $(\phi,\theta) = (0°,0°)$;
where $\theta = 0°$ is normal to the opening in the shroud.

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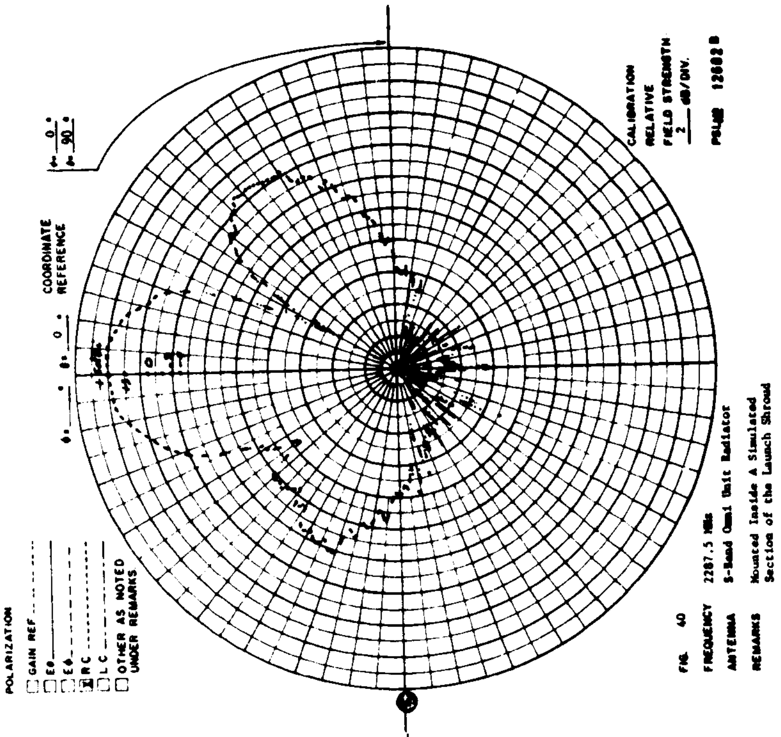

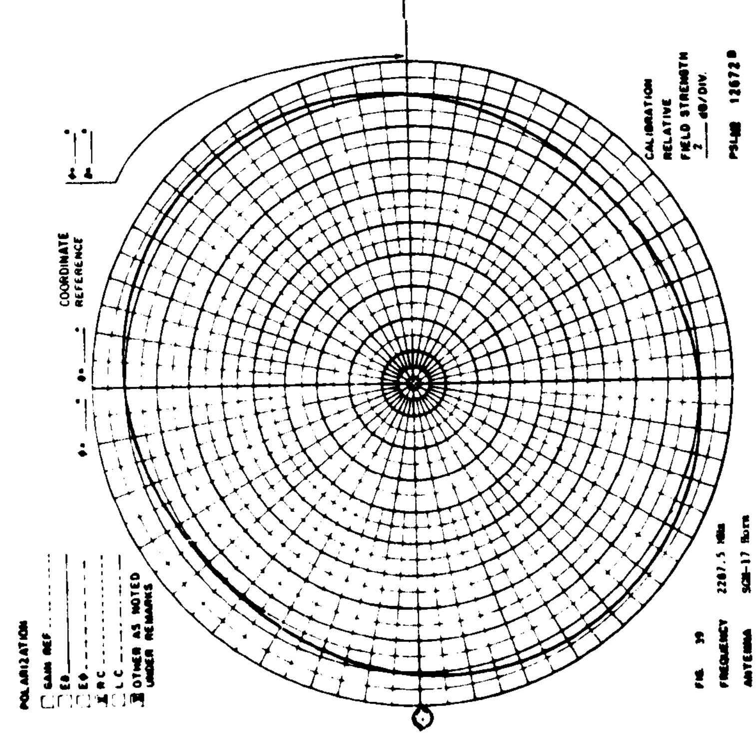

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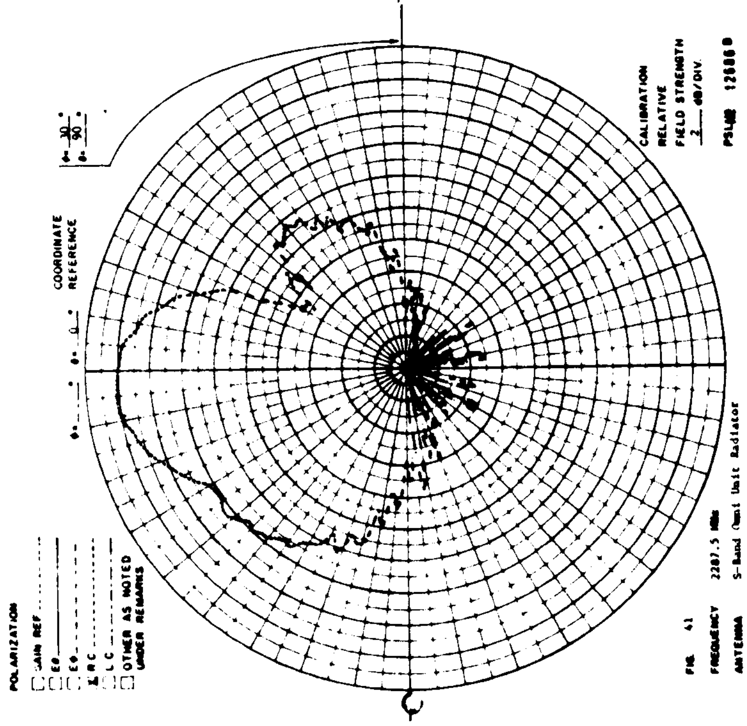

FIG 41
FREQUENCY 2287.5 MHz
ANTENNA S-Band Omni Unit Radiator
REMARKS Mounted Inside A Simulated Section of the Launch Shroud

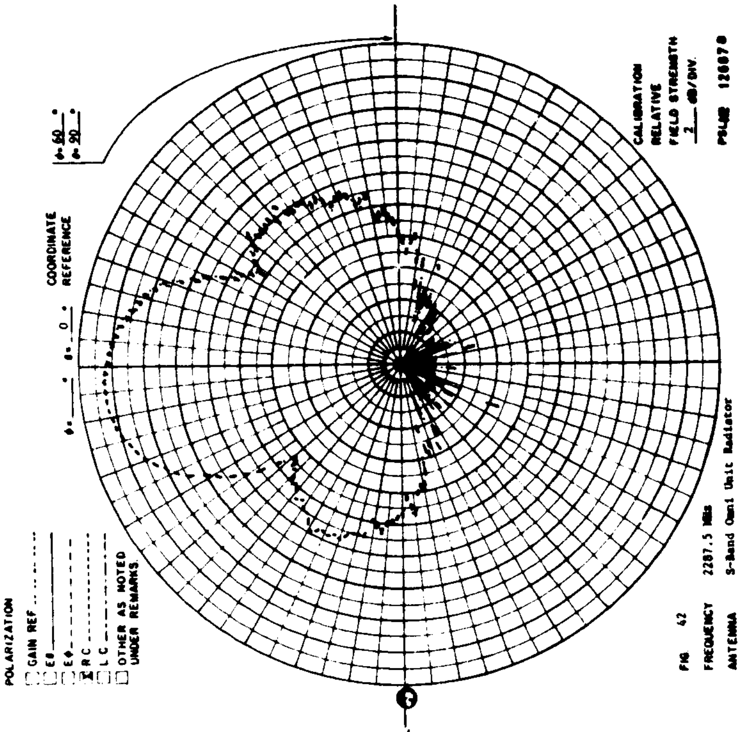

FIG 42
FREQUENCY 2287.5 MHz
ANTENNA S-Band Omni Unit Radiator
REMARKS Mounted Inside A Simulated Section of the Launch Shroud

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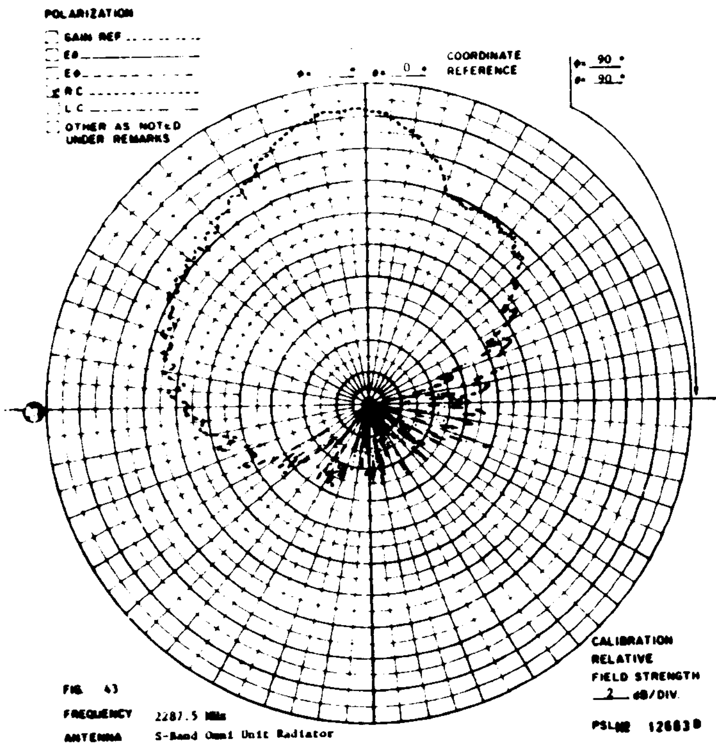

FIG 43

FREQUENCY 2287.5 MHz

ANTENNA S-Band Omni Unit Radiator

REMARKS Mounted Inside A Simulated Section of the Launch Shroud

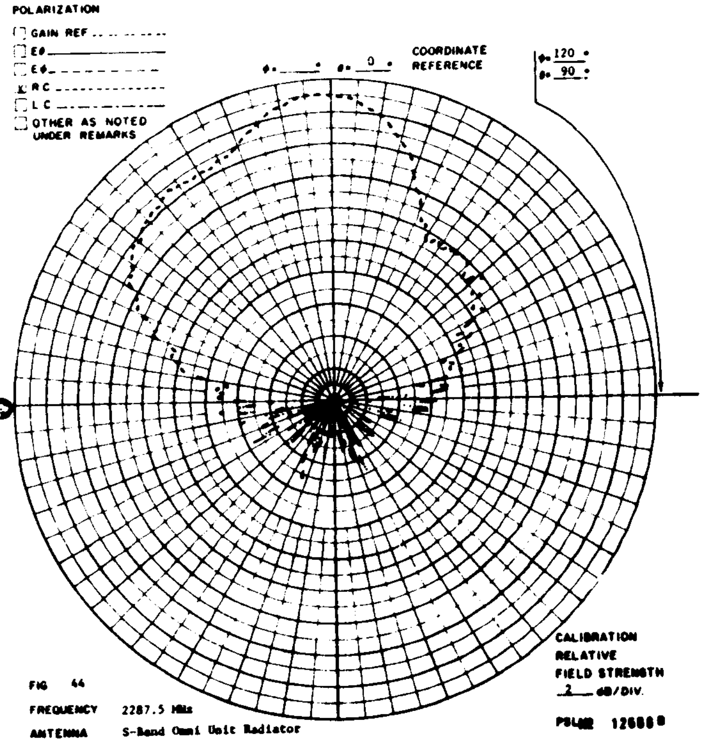

FIG 44

FREQUENCY 2287.5 MHz

ANTENNA S-Band Omni Unit Radiator

REMARKS Mounted Inside A Simulated Section of the Launch Shroud

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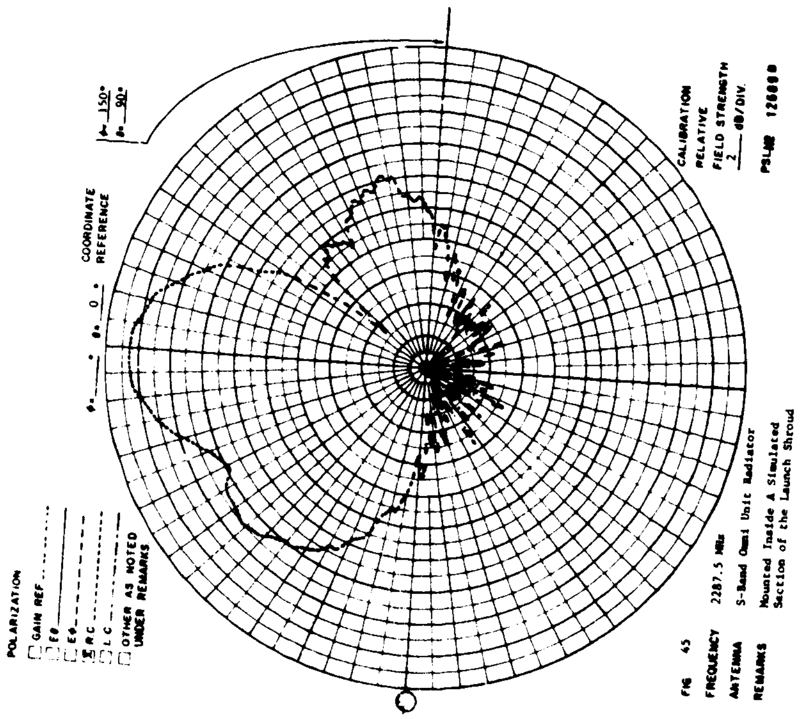

9.0 DETERMINE ISOLATION REQUIRED BETWEEN THE HIGH-GAIN ANTENNA AND THE S-BAND OMNI ARRAY IN THE RF COMBINER AND HARNESS NETWORK

9.1 Test Circuit

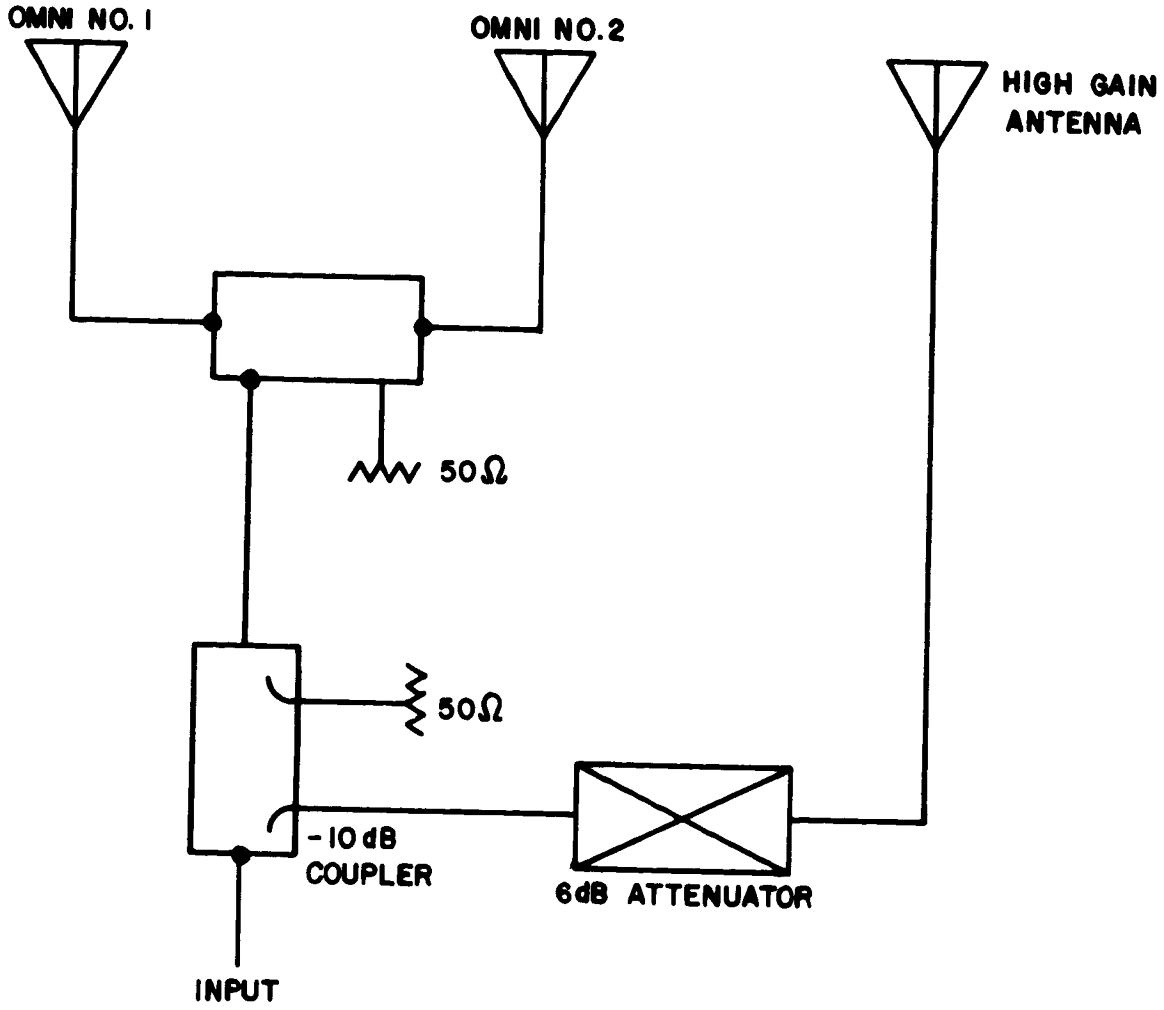

Fig. 46 - Final Test Circuit - R.F. Combiner Test

9.2 High-Gain Antenna Simulation

9.2.1 The S-Band High-Gain antenna was simulated by constructing it in a lighweight, perforated surface style as shown in the accompanying photographs. The S-Band feed for this antenna was furnished by TRW. The Ku-Band dichroic reflector was not included in these tests.

9.2.2 To show that the antenna is a reasonable simulation of the flight configuration, free-space patterns were measured with Left Circular polarization (which is the normal operating mode for this antenna). Peak gain measured was (+26 dBi). The patterns show expected low level (-24 dB) side lobes and back lobe radiation greater than (-40 dB) down. The omni array operates normally as a Right Circularly polarized antenna and therefore patterns were measured to show the Right Circular polarization characteristics of the high-gain antenna. The peak measured gain for this polarization was (+11.3 dBi). The sidelobe structure covers a fairly broad total angle at levels approaching (-7.0 dBi).

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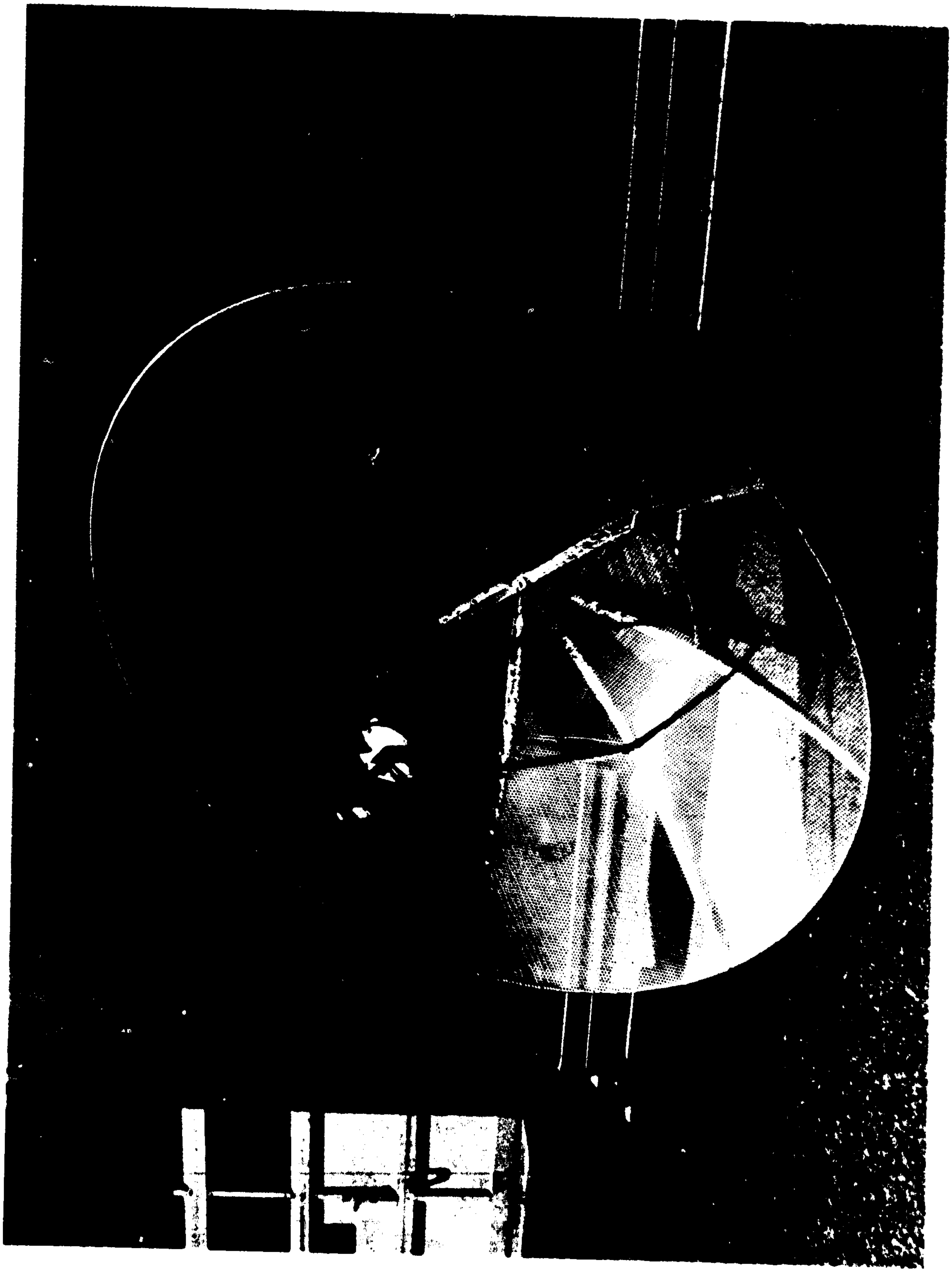

Fig. 47 - Simulated High-Gain Antenna - Front View

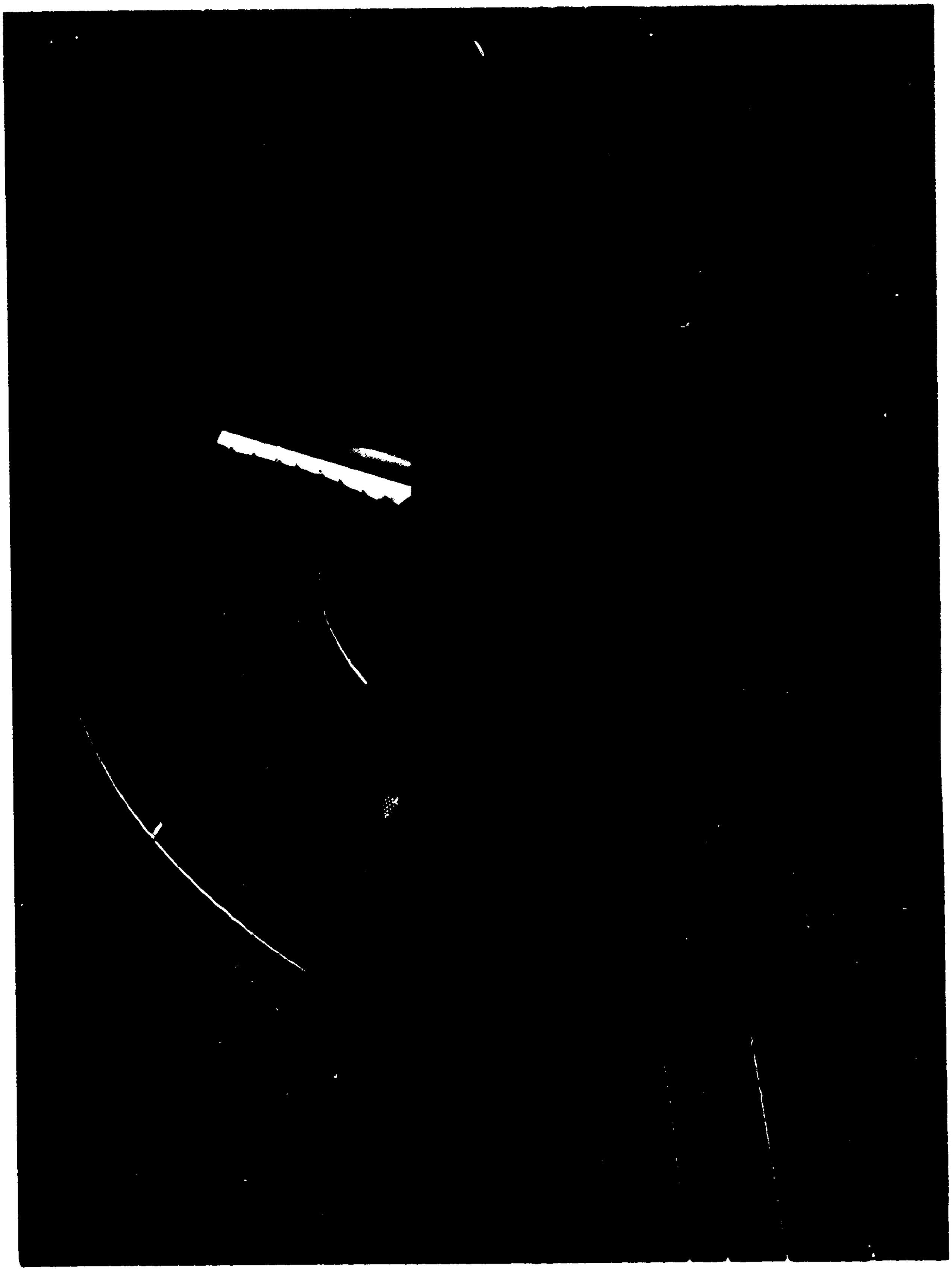

Fig. 48 - Simulated High-Gain Antenna - Front View

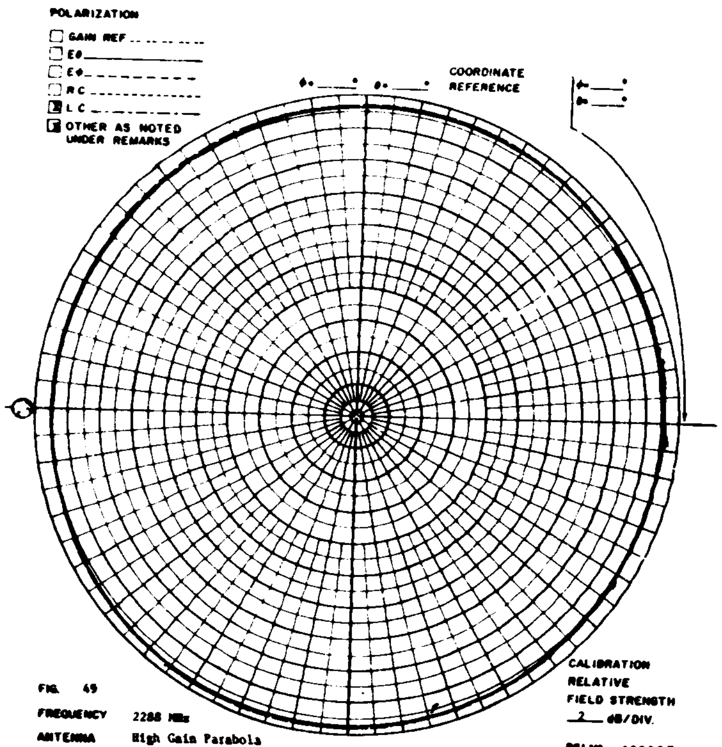

FIG. 49
FREQUENCY 2288 MHz
ANTENNA High Gain Parabola
REMARKS Circularity Check
Solid Line - Rotating Linear Source
Dashed Line - Rotating High Gain Antenna

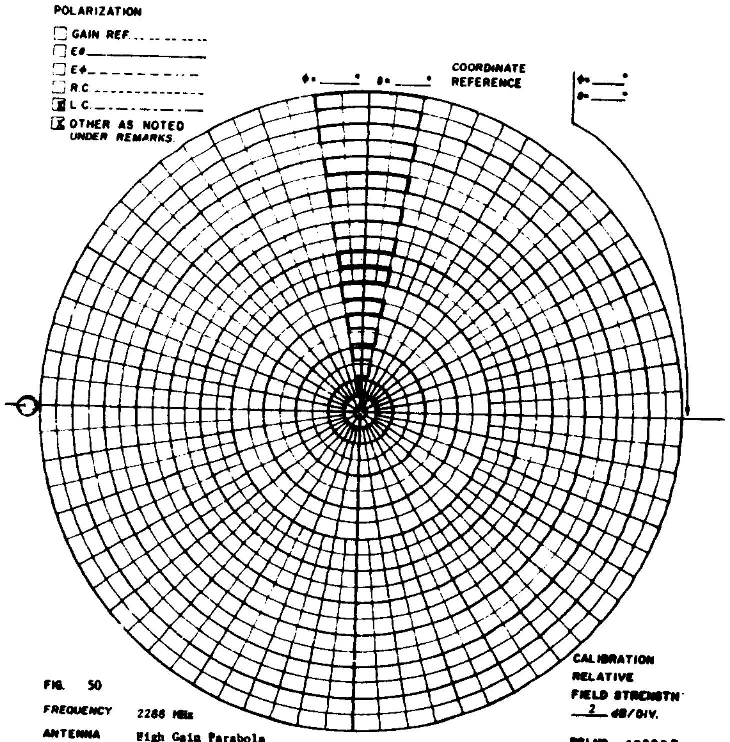

FIG. 50
FREQUENCY 2288 MHz
ANTENNA High Gain Parabola
REMARKS System Linearity Check

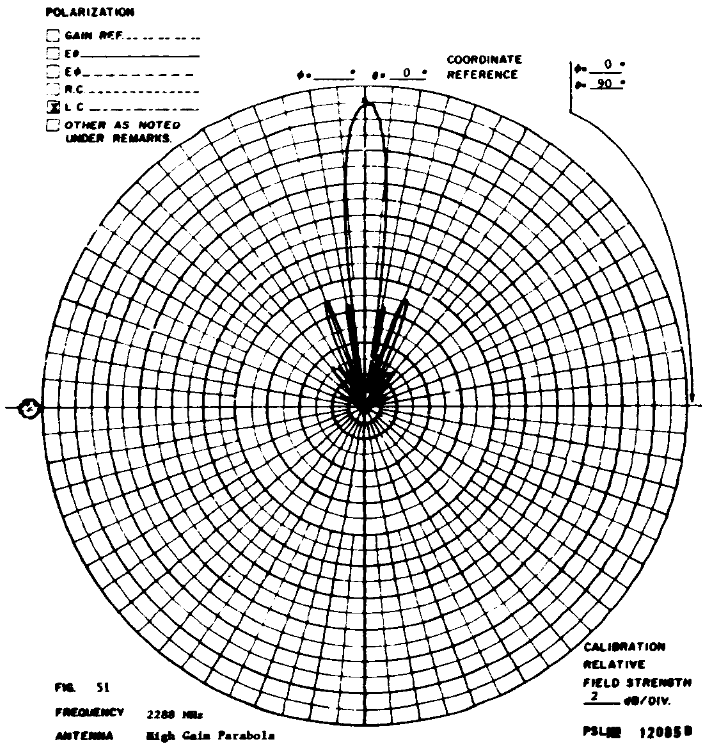

FIG. 51
FREQUENCY 2288 MHz
ANTENNA High Gain Parabola
REMARKS Gain = +26 dBi
TRW Furnished Feed

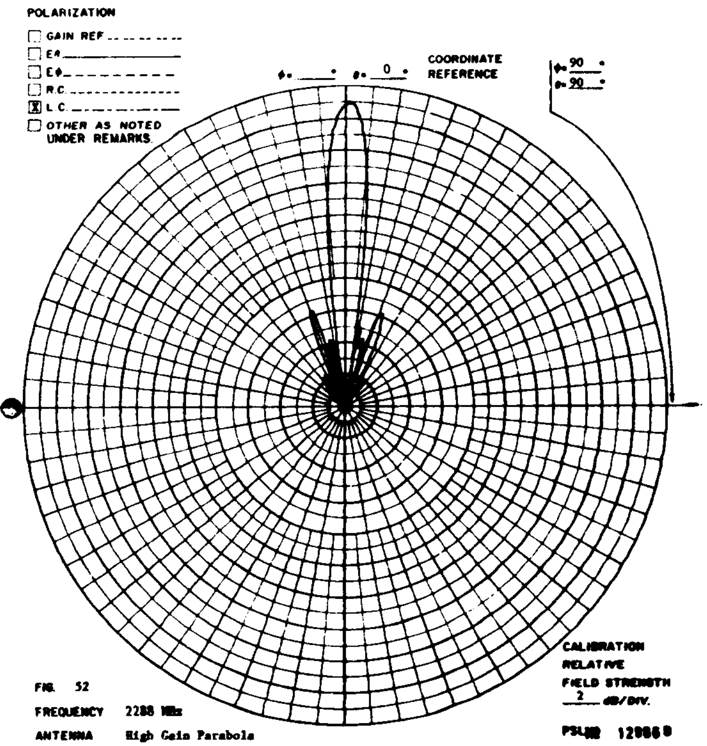

FIG. 52
FREQUENCY 2288 MHz
ANTENNA High Gain Parabola
REMARKS

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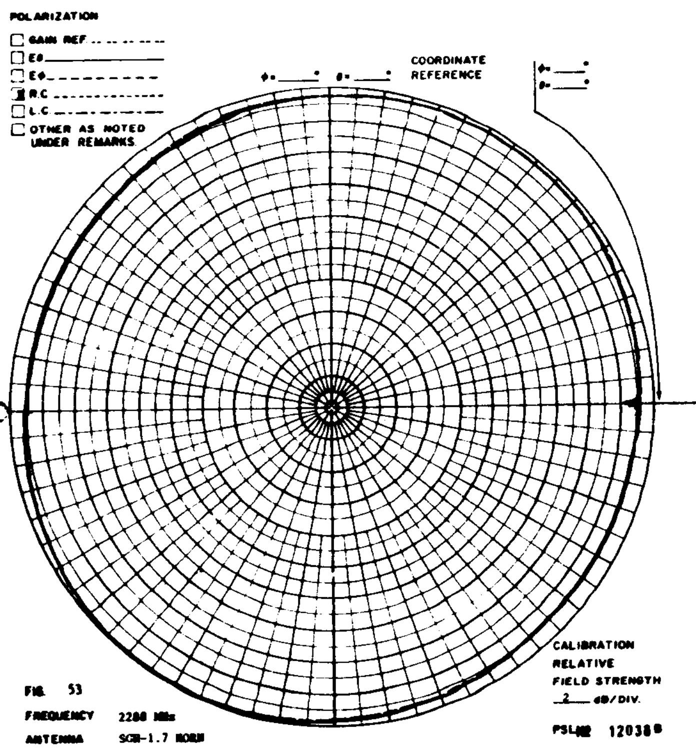


FIG. 53
FREQUENCY 2288 MHz
ANTENNA SGH-1.7 HORN
REMARKS Source Circularity Check
Solid Line - rotating R.C. Source
Dashed Line - rotating SGH-1.7 Horn

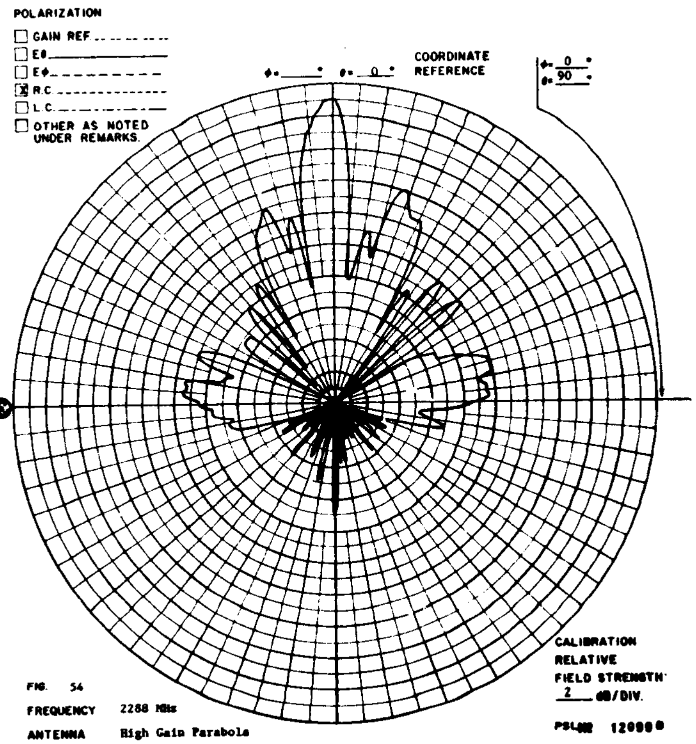
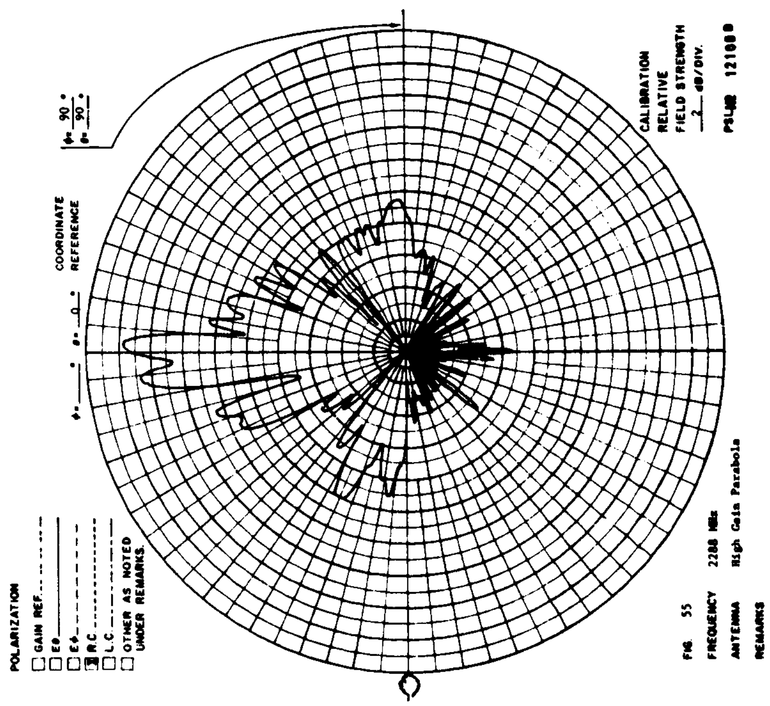


FIG. 54
FREQUENCY 2288 MHz
ANTENNA High Gain Parabola
REMARKS Gain = +11.3 dBi
TRW Furnished Feed


POLARIZATION
GAIN REF.
Eθ
Eφ
R.C.
L.C.
OTHER AS NOTED UNDER REMARKS.
COORDINATE REFERENCE
φ= 90°
θ= 90°
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.
PSL# 12188B
FIG 55
FREQUENCY 2288 MHz
ANTENNA High Gain Parabola
REMARKS

9.3 Isolation Measurements

9.3.1 A number of tests were made by positioning the solar array and the High-Gain antenna in various positions. The data included here are a minimum to show the results of these many tests.

9.3.2 Pattern No. 13623B shows a $\phi = 0°$ scan with the solar array at (-X) and the High-Gain antenna pointing toward (-Z). The High-Gain antenna transmission line is not connected into the combiner circuit but shadowing of the omni-array pattern is apparent in quadrant 4.

9.3.3 The High-Gain antenna was positioned to point toward (-X) and this antenna was then connected to the combiner circuitry with only 3 dB isolation. Interference is apparent in the third quadrant on pattern No. 13635B and the main lobe of the High-Gain antenna is apparent at $(\theta,\phi) = (90°,180°)$.

9.3.4 After searching through several High-Gain antenna positions, the High-Gain antenna was positioned at $(\theta,\phi) = (150°,270°)$ and the solar array was left at (-X). This High-Gain antenna position means the antenna points in a direction (-30°) from (-Z) toward the (-Y) axis. Pattern No. 13641B shows the results with only 3 dB isolation. The main beam of the High-Gain antenna is apparent at $(\theta,\phi) = (150°,270°)$ or in the third quadrant.

9.3.5 The series of pattern numbers 13641B, 13542B, 13547B, 13544B and 13646B show the coupling effects as the isolation is increased from 3 dB through 20 dB; and finally on 13646B the High-Gain antenna transmission line was disconnected from the combiner circuit. This series was taken in a $\phi = 90°$ scan. It can be seen the 16 dB isolation should be sufficient.

9.3.6 Pattern Nos. 13674B and 13681B were measured at 2288 MHz to show the interaction between the High-Gain antenna and the omni array at that frequency. The principal region of interference is at $(\theta,\phi) = (150°,270°)$.

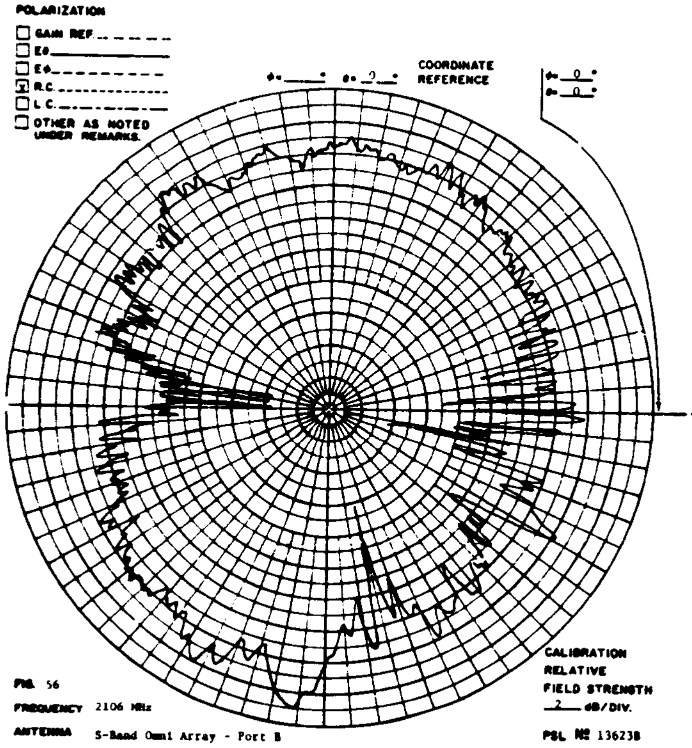


FIG. 56

FREQUENCY 2106 MHz

ANTENNA S-Band Omni Array - Port B

REMARKS Solar Panel (-X)
High Gain Antenna (-Z) - Not in circuit

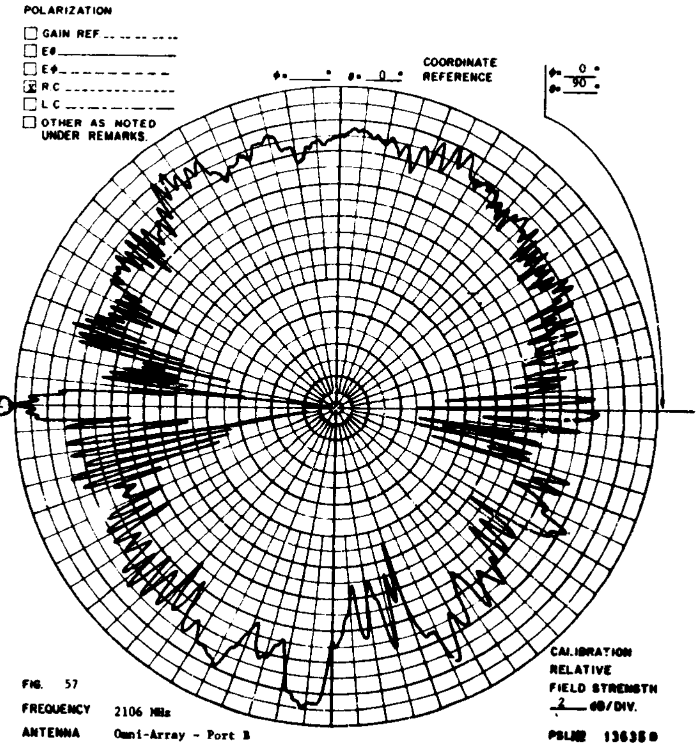


FIG. 57

FREQUENCY 2106 MHz

ANTENNA Omni-Array - Port B

REMARKS Solar Array (-X)
High Gain Antenna (-X) - Connected to Combiner
3dB Isolation -

(Rand Copy)

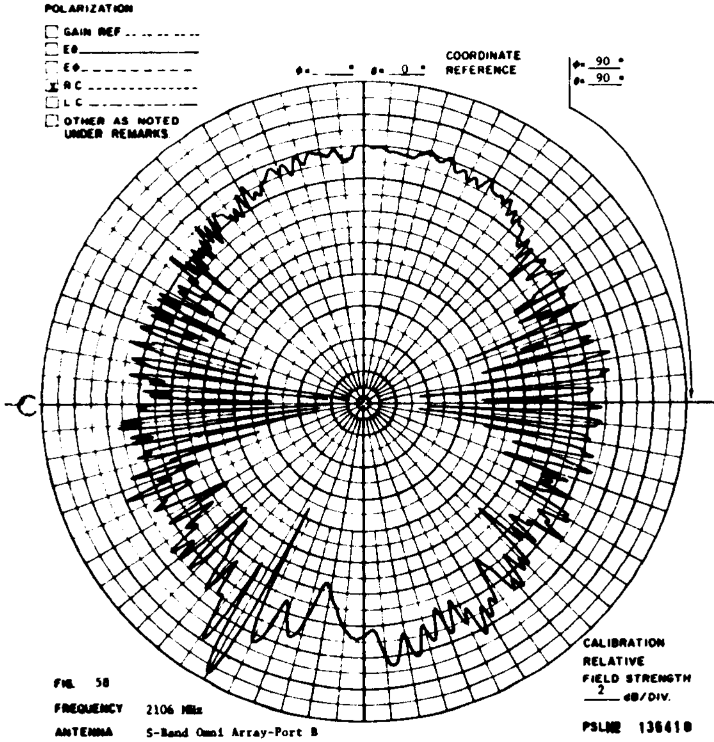


FIG. 58
FREQUENCY 2106 MHz
ANTENNA S-Band Omni Array-Port B
REMARKS Solar Panel (-X)
High Gain Antenna 30° from (-Z) toward (-X), or (Θ, ϕ) = (150°, 270°)
High Gain Antenna connected to Combiner circuit 3dB Isolation

PSLNE 136410

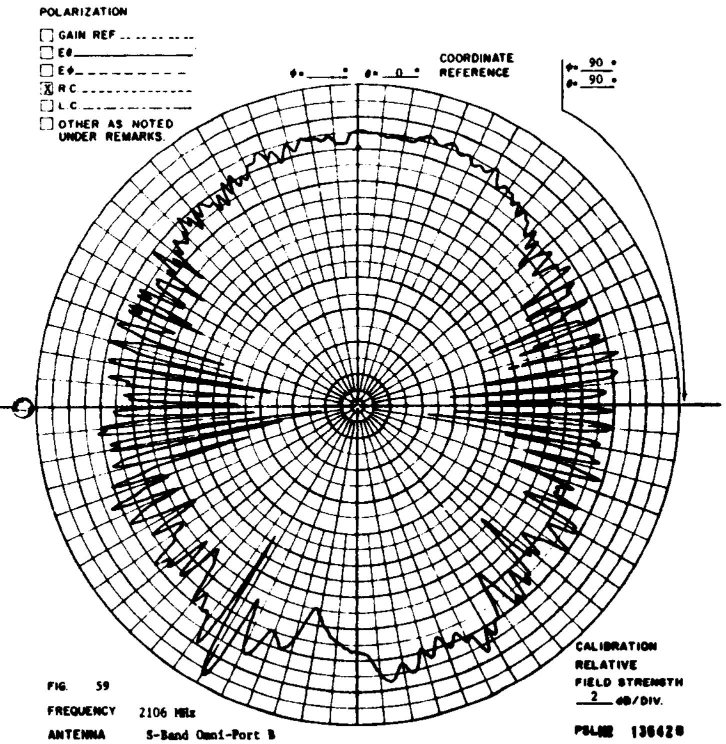
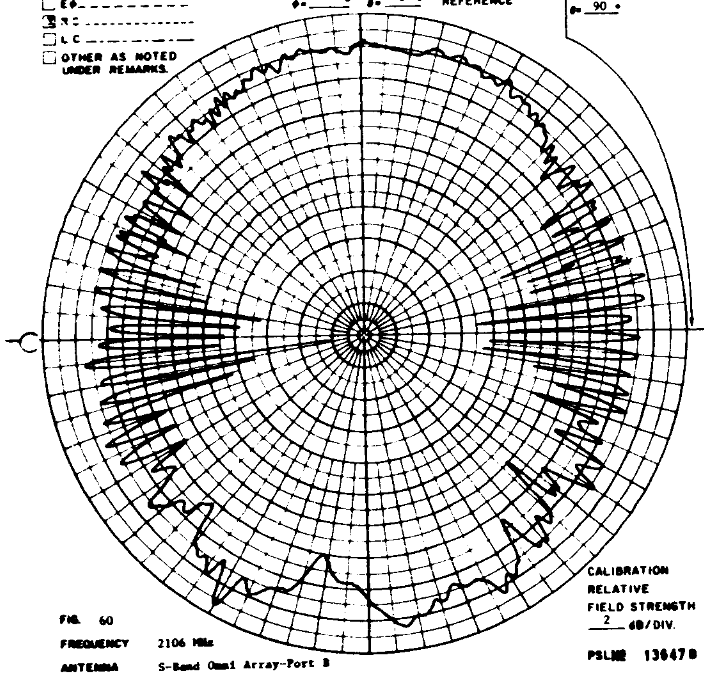


FIG. 59
FREQUENCY 2106 MHz
ANTENNA S-Band Omni-Port B
REMARKS Solar Array (-X)
High Gain Antenna 30° from (-Z) toward (-Y), or (Θ, ϕ) = (150°, 270°)
High Gain Antenna connected to Combiner circuit 10dB Isolation

PSLNE 136420

POLARIZATION
- [ ] GAIN REF
- [ ] Eθ
- [ ] Eϕ
- [x] R C
- [ ] L C
- [ ] OTHER AS NOTED UNDER REMARKS

ϕ = ___° θ = 0° COORDINATE REFERENCE
θ = 90°
ϕ = 90°



CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.

FIG. 60

FREQUENCY 2106 MHz

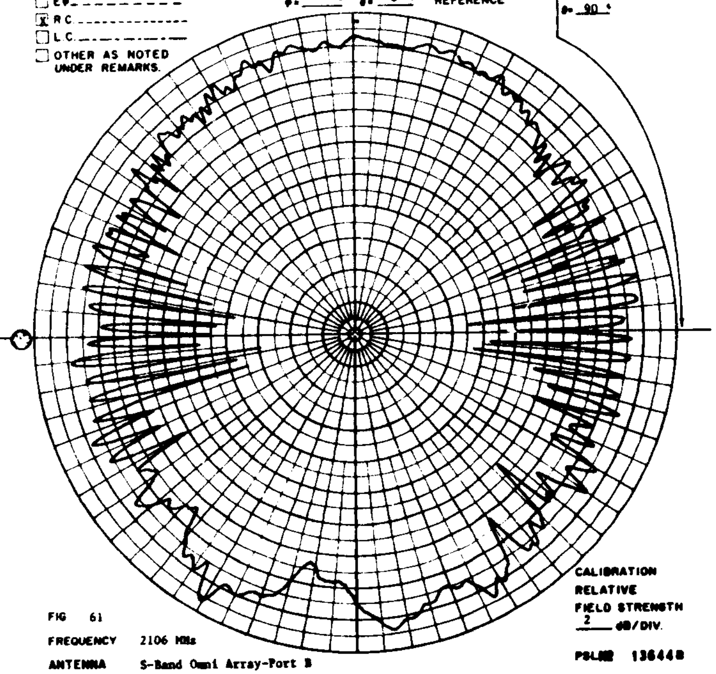
ANTENNA S-Band Omni Array-Port B

REMARKS Solar Array (-X)
High Gain Antenna 30° from (-Z) toward (-Y), or (θ, ϕ) = (150°, 270°)
High Gain Antenna connected to the Combiner circuit 16dB Isolation

PSL 136470

POLARIZATION
- [ ] GAIN REF
- [ ] Eθ
- [ ] Eϕ
- [x] R C
- [ ] L C
- [ ] OTHER AS NOTED UNDER REMARKS

ϕ = ___° θ = 0° COORDINATE REFERENCE
θ = 90°
ϕ = 90°



CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.

FIG 61

FREQUENCY 2106 MHz

ANTENNA S-Band Omni Array-Port B

REMARKS Solar Array (-X)
High Gain Antenna 30° from (-Z) toward (-Y), or (θ, ϕ) = (150°, 270°)
High Gain Antenna Connected to Combiner Circuit 20dB Isolation

PSL 136440

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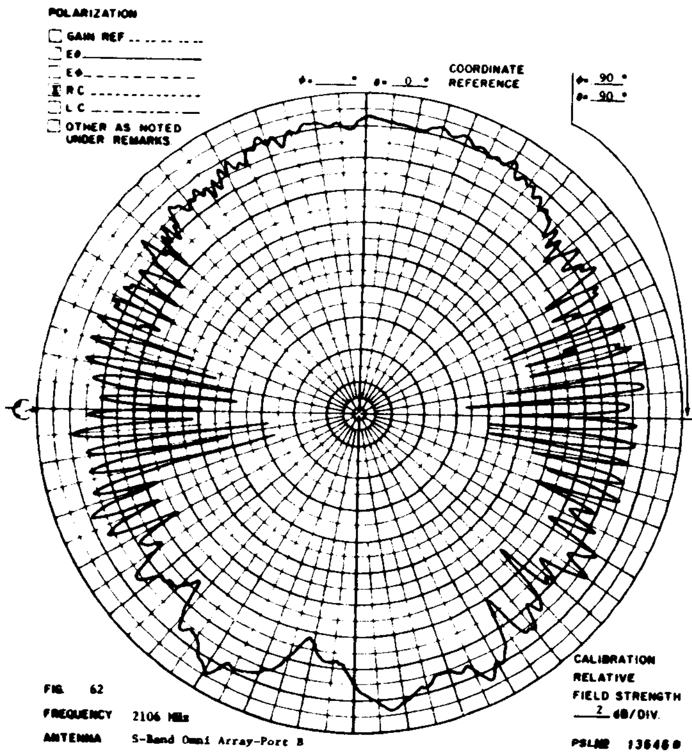

FIG. 62

FREQUENCY 2106 MHz

ANTENNA S-Band Omni Array-Port B

REMARKS Solar Array (-X)
High Gain Antenna 30° from (-Z) toward (-Y), or (θ, φ)
High Gain Antenna Not Connected

PSLNB 136460

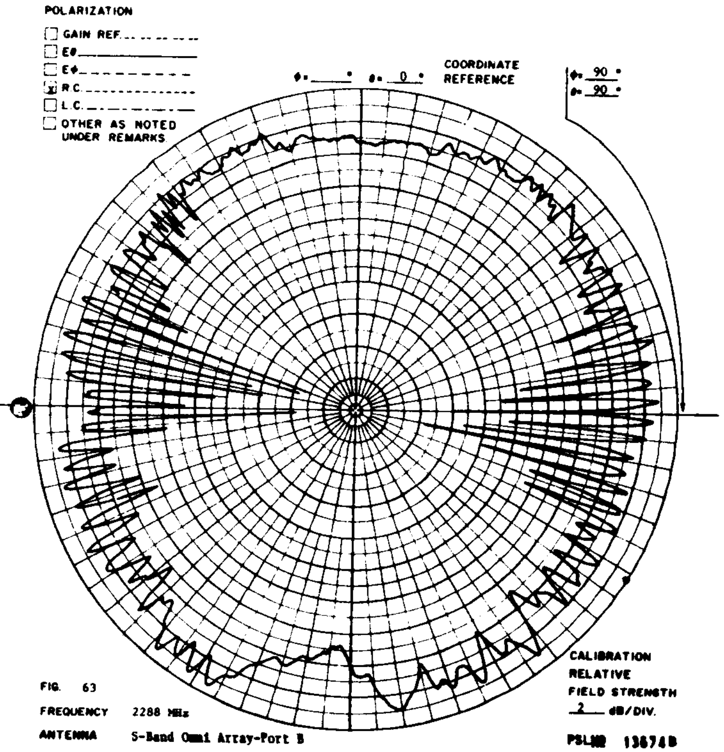

FIG. 63

FREQUENCY 2288 MHz

ANTENNA S-Band Omni Array-Port B

REMARKS Solar Array (-X)
High Gain Antenna 30° from (-Z) toward (-Y), or (θ, φ) - (150°, 270°)
High Gain Antenna connected to Combiner 16dB Isolation

PSLNB 136748

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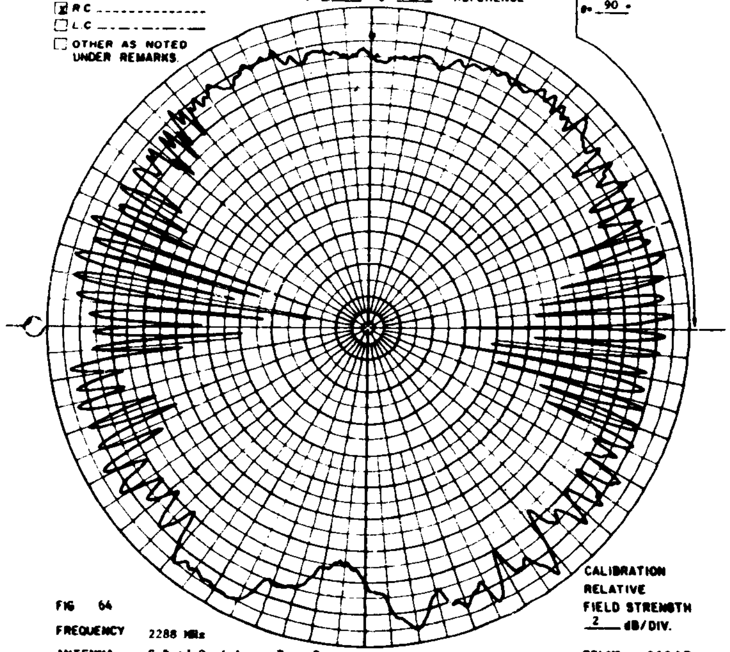
POLARIZATION
- [ ] GAIN REF
- [ ] Eθ
- [ ] Eϕ
- [x] R.C.
- [ ] L.C.
- [ ] OTHER AS NOTED UNDER REMARKS

ϕ= ___° θ= 0° COORDINATE REFERENCE ϕ= 90° θ= 90°



CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.

FIG 64

FREQUENCY 2288 MHz

ANTENNA S-Band Omni Array-Port B

PSL№ 13681B

REMARKS Solar Array (-X)
High Gain Antenna 30° from (-Z) toward (-Y), or (θ, ϕ) = (150°, 270°)
High Gain Antenna Not Connected

10.0 LOBE OVERLAPPING BETWEEN PORT A AND B - S-BAND OMNI ARRAY ANTENNA

10.1 Measurements

10.1.1 Data on Fig.'s 65, 66, and 67 show that in the $\theta = 90°$ area the interference lobe structure shifts just enough in angle for the lobes of one port to just overlap the nulls of the opposite port.

It should be specifically noted, however, that there is a drop in the general signal level in some direction about phi (ϕ). For example note that the lobe amplitude on Fig. 67 at both $(\theta,\phi) = (80°,90°)$ and $(160°,90°)$ is generally high while Fig. 65 shows a general dip in amplitude on both sides of the pattern at $\theta = 90°$. Similarity from both ports in the pattern shape is also noted.

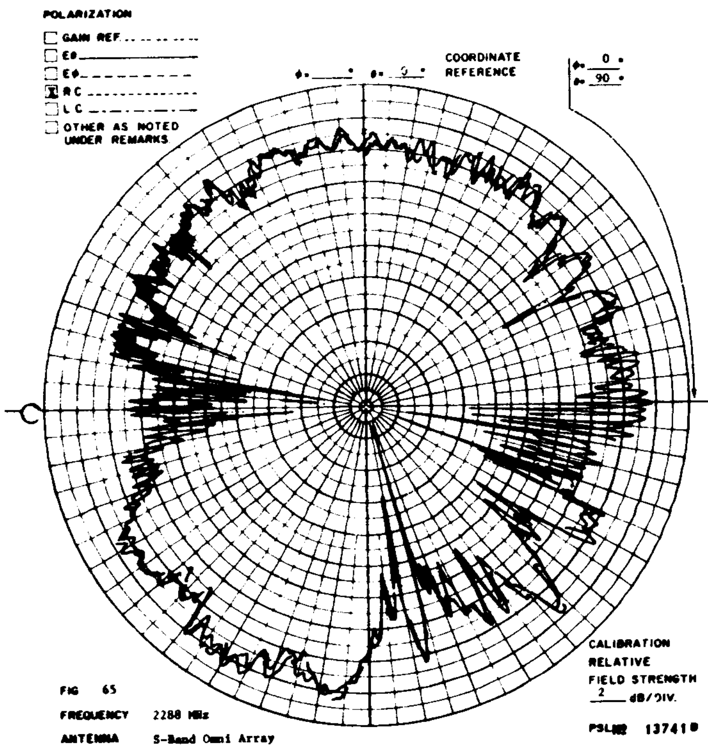


FIG 65

FREQUENCY 2288 MHz

ANTENNA S-Band Omni Array

REMARKS Solar Array (-Z)
High Gain Antenna (-Z)
Solid Line Port A
Dashed Line Port B
Demonstrating Overlapping of lobes in the Theta equal 90 degree area.

PSL 13741

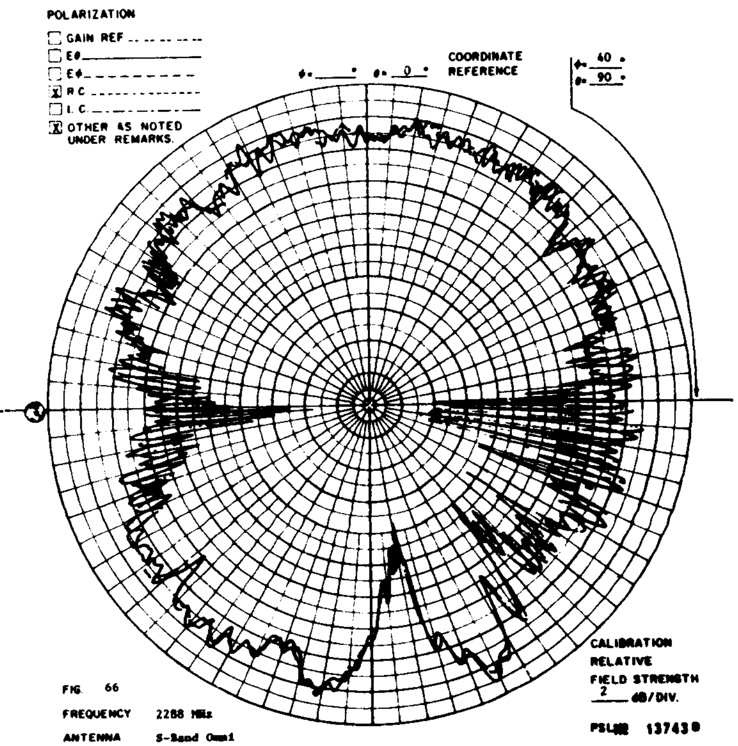


FIG. 66

FREQUENCY 2288 MHz

ANTENNA S-Band Omni

REMARKS Solar Array (-Z)
High Gain Antenna (-Z)
Solid line Port A
Dashed Line Port B
Demonstrating Overlapping of lobes in the Theta equal 90 degree area.

PSL 13743

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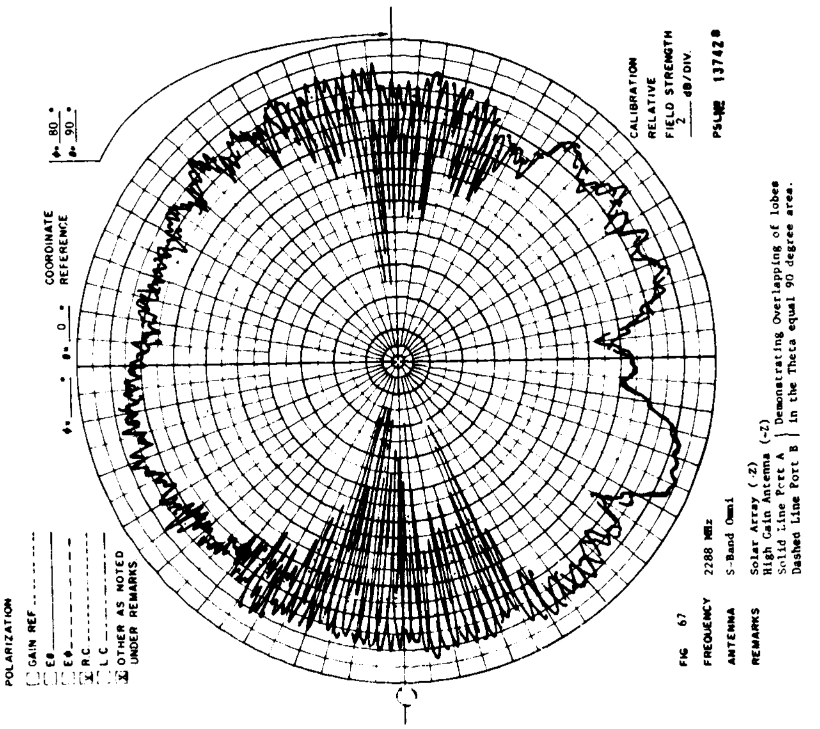

11.0 FREE-SPACE ANTENNA PATTERNS

11.1 Antenna Range

11.1.1 The NMSU/PSL 120 foot model antenna range was utilized for the free-space measurements. No photography was taken during Landsat-D measurements, but the photographs shown on Fig.'s 68 and 69 shown one of the earlier Landsat sensor ring mockups undergoing text. These photographs are shown to exhibit the model reange. Distance from the ground to the center of the test mockup, or the test antenna for Landsat-D, is 33 feet. The absorber block shown on Fig. 68 reduces ground reflections. This block was used during the Landsat-D measurements.

11.2 Outline of Free-Space Measurements

11.2.1 Chart No. 2 outlines all free-space measurements made.

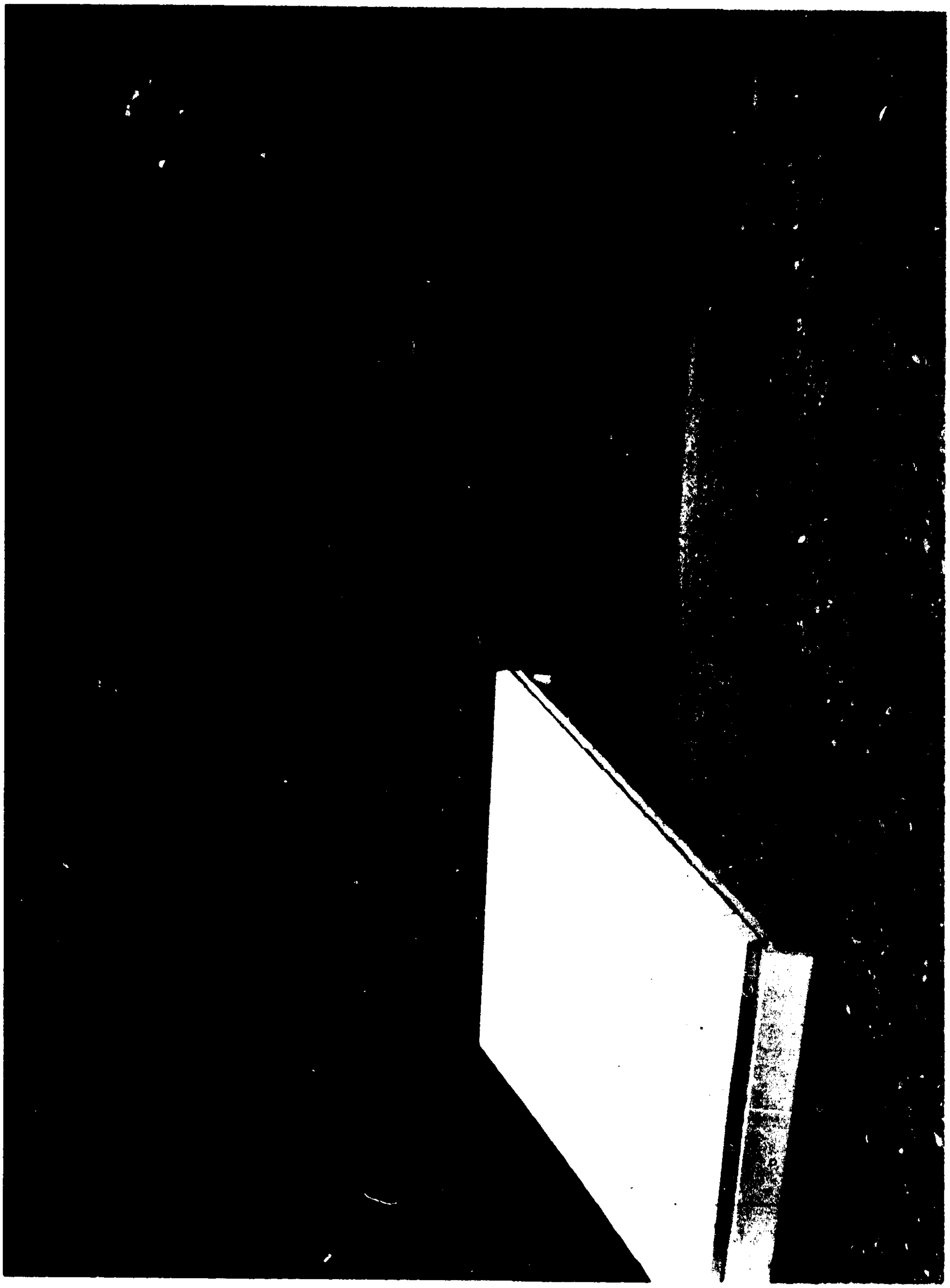

Fig. 68 - Model Range Rotator - Absorber In Place

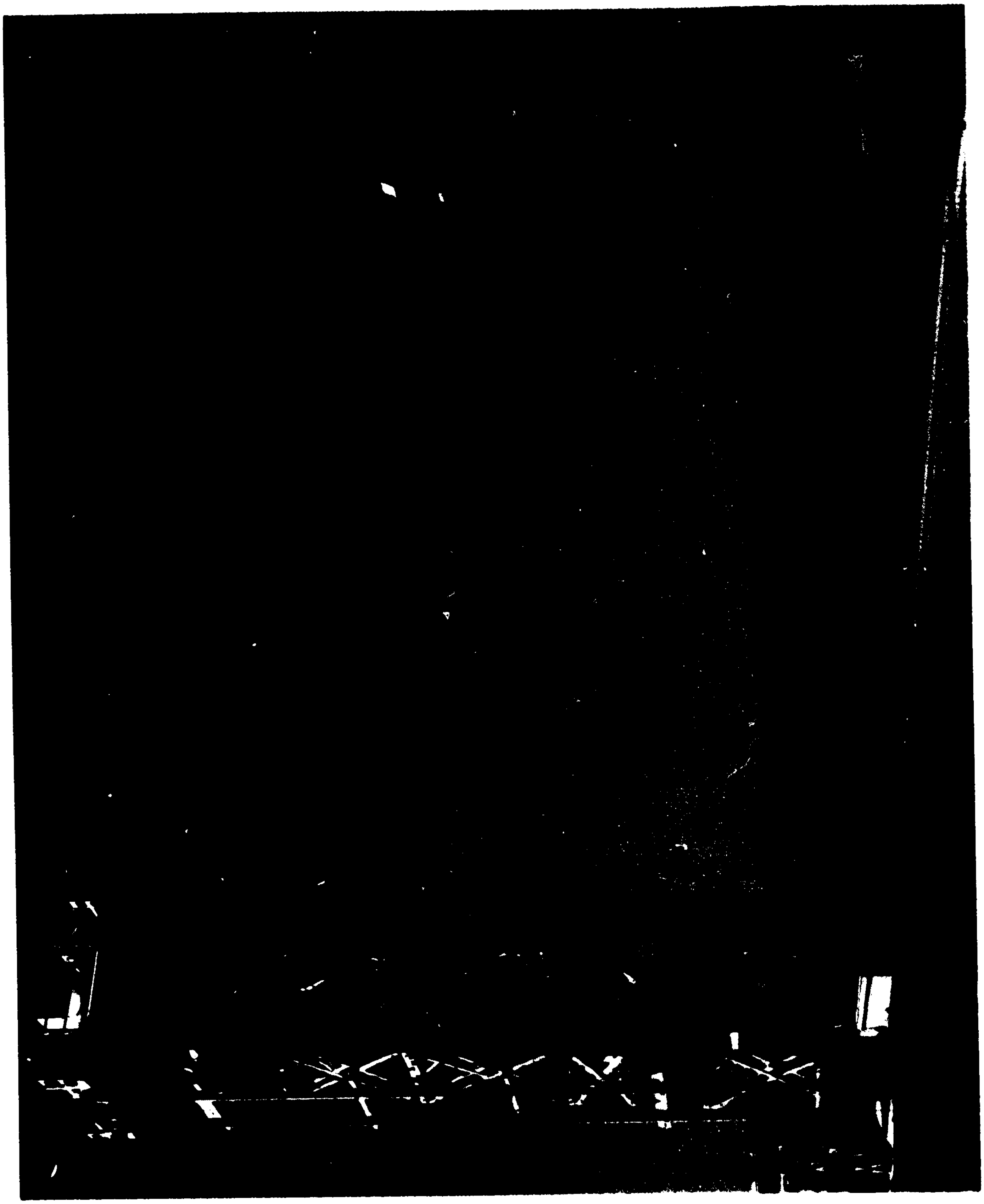

Fig. 69 - Model Range

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C-2

Antenna	Freq. (MHz)	Range Length	Survey Data	Full Set Data	Power Contour Plot Upper Hemis.	Power Contour Plot Lower Hemis.	Peak Gain (dBi)	Direction (θ,φ)	Polarization Data
S-Band Omni No. 1	2106	120'	Yes	No	No	No	+5.1	(90°,0°)	Yes
	2288	120'	Yes	No	No	No	+3.7	(90°,0°)	Yes
S-Band Omni No. 2	2106	120'	Yes	No	No	No	+4.8	(90°,0°)	Yes
	2288	120'	Yes	No	No	No	+3.8	(90°,0°)	Yes
S-Band Shaped Beam No. 1	2266	120'	Yes	No	No	No	+3.9	(90°,0°)	Yes
S-Band Shaped Beam No. 1	2266	120'	Yes	No	No	No	+3.7	(90°,0°)	Yes
GPS Antenna	1228	120'	Yes	No	No	No	+5.3	(90°,0°)	Yes
	1575	120'	Yes	No	No	No	+1.7	(90°,0°)	Yes
X-Band Shaped Beam No. 2	8212.5	120'	Yes	No	No	No	+8.3	(64°,0°)	Yes (measured for No. 1)

Chart No. 2 - Free Space Antenna Pattern Outline

11.3 S-Band Omni Unit Radiator No. 1 - 2106 MHz

11.3.1 Antenna Patterns - R.C. Polarization

Measured Gain = +5.1 dBi at $(\phi,\theta) = (0°,0°)$

2106 MHz

Polarization Axial Ratio

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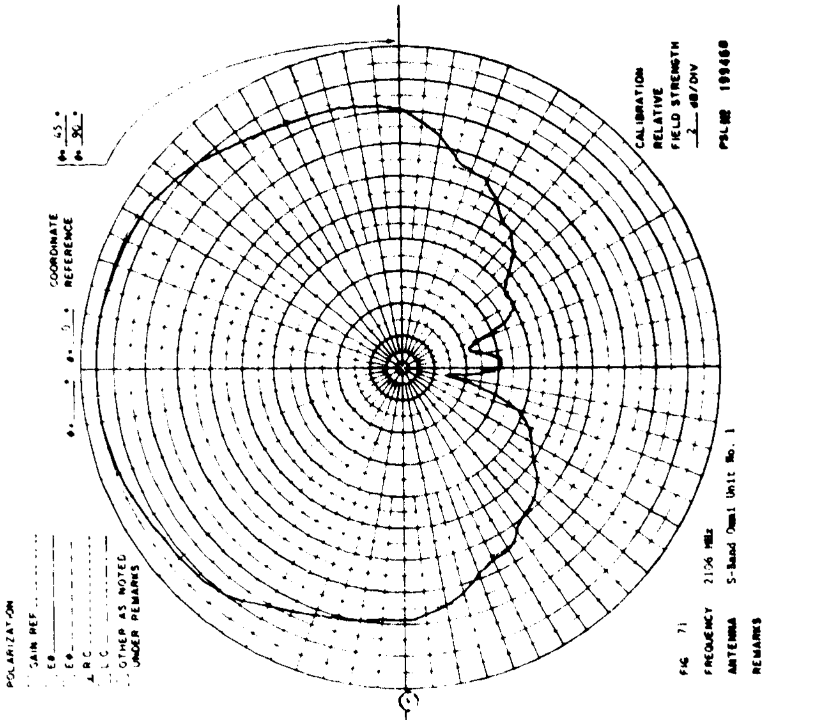
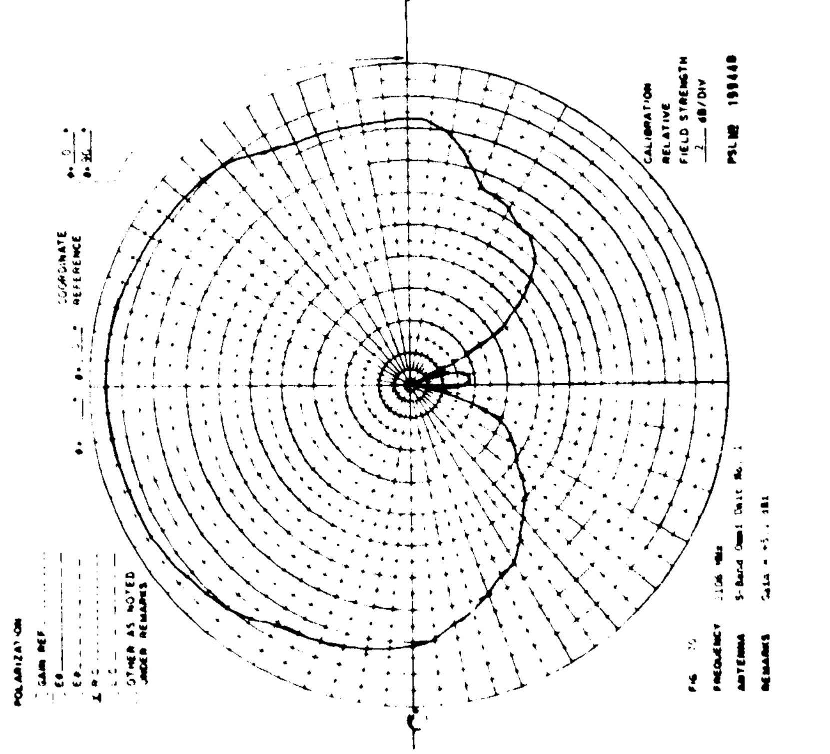
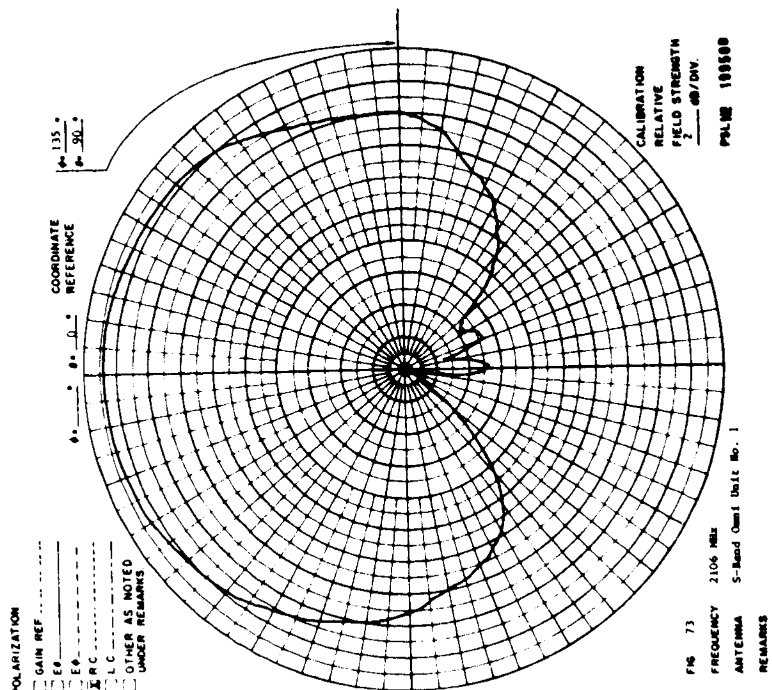
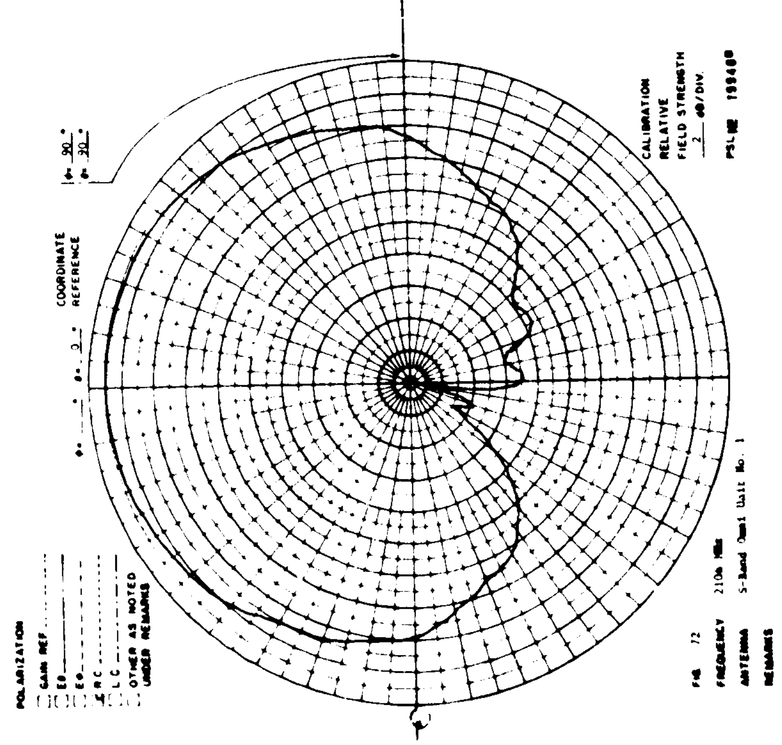





POLARIZATION
GAIN REF.
Eθ
Eφ
RC
LC
OTHER AS NOTED UNDER REMARKS
COORDINATE REFERENCE
θ= 135°
φ= 90°
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.
PSL NR 199500
FIG 73
FREQUENCY 2106 MHz
ANTENNA S-Band Omni Unit No. 1
REMARKS


POLARIZATION
GAIN REF.
Eθ
Eφ
RC
LC
OTHER AS NOTED UNDER REMARKS
COORDINATE REFERENCE
θ= 90°
φ= 30°
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.
PSL NR 199480
FIG 72
FREQUENCY 2106 MHz
ANTENNA S-Band Omni Unit No. 1
REMARKS

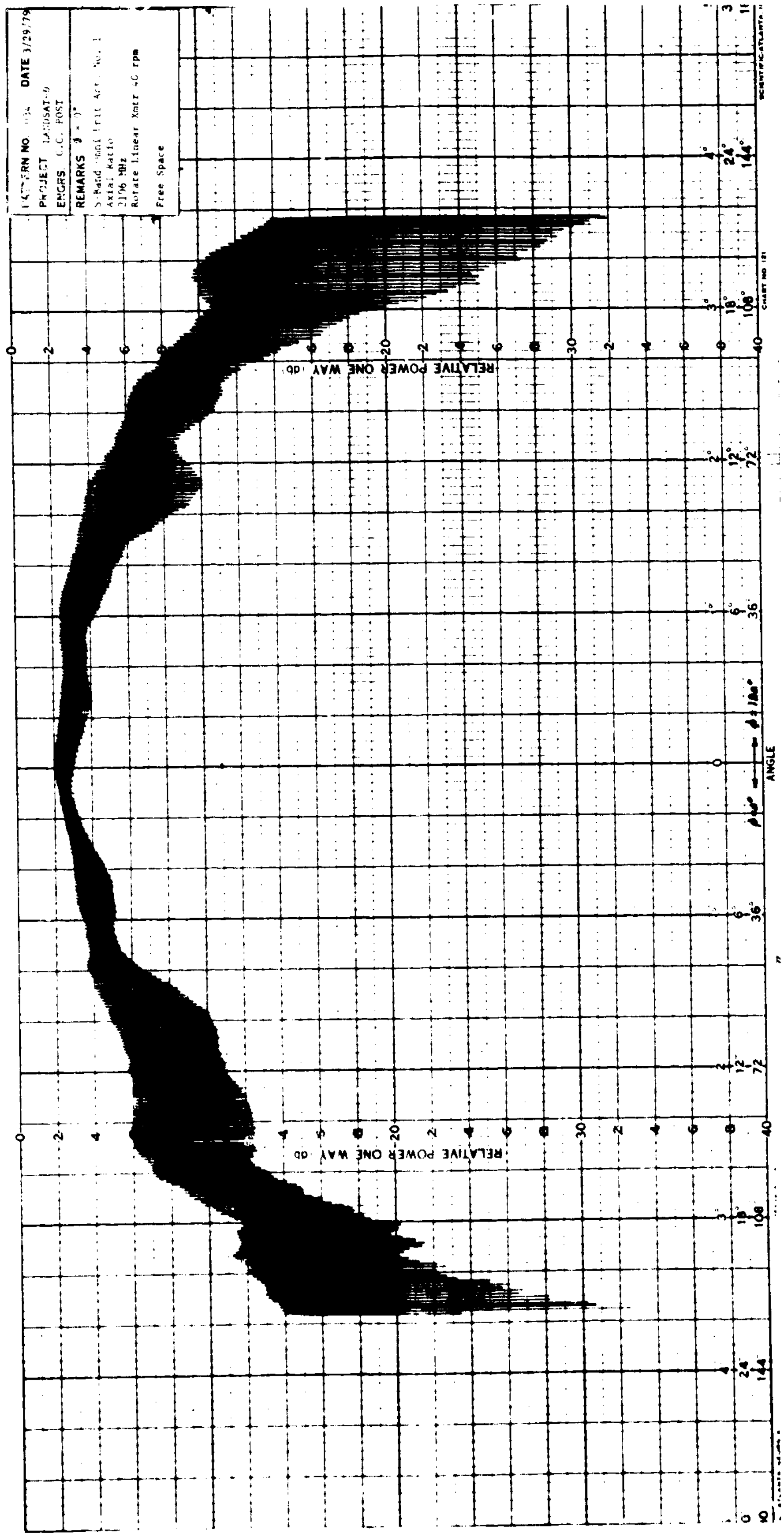


Fig. 74

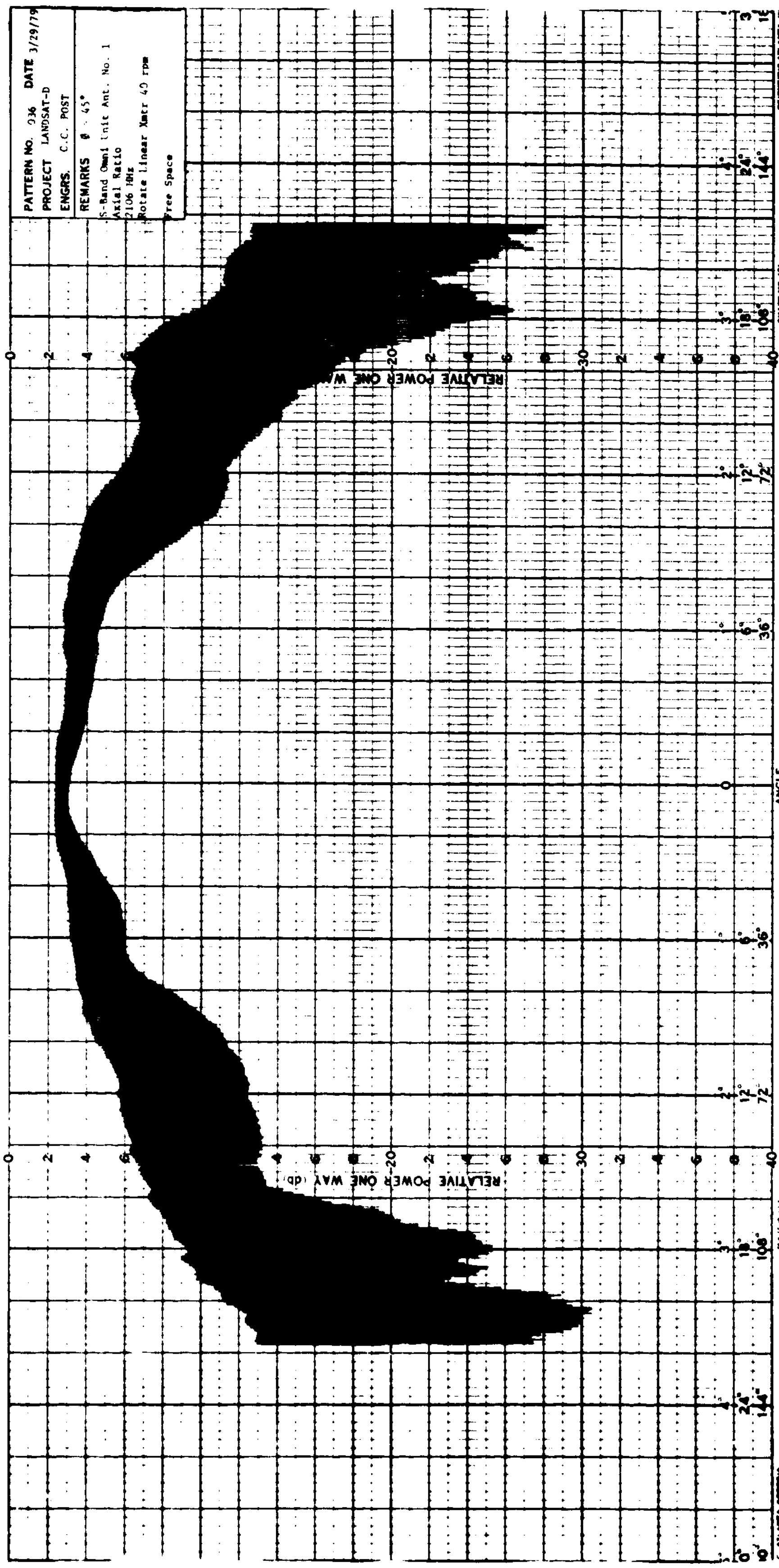

PATTERN NO. 936 DATE 3/29/79
PROJECT LANDSAT-D
ENGRS. C.C. POST
REMARKS θ = 45°
S-Band Omni Unit Ant. No. 1
Axial Ratio
2106 MHz
Rotate Linear Xmtr 40 rpm
Free Space
RELATIVE POWER ONE WAY (db)
ANGLE

Fig. 75

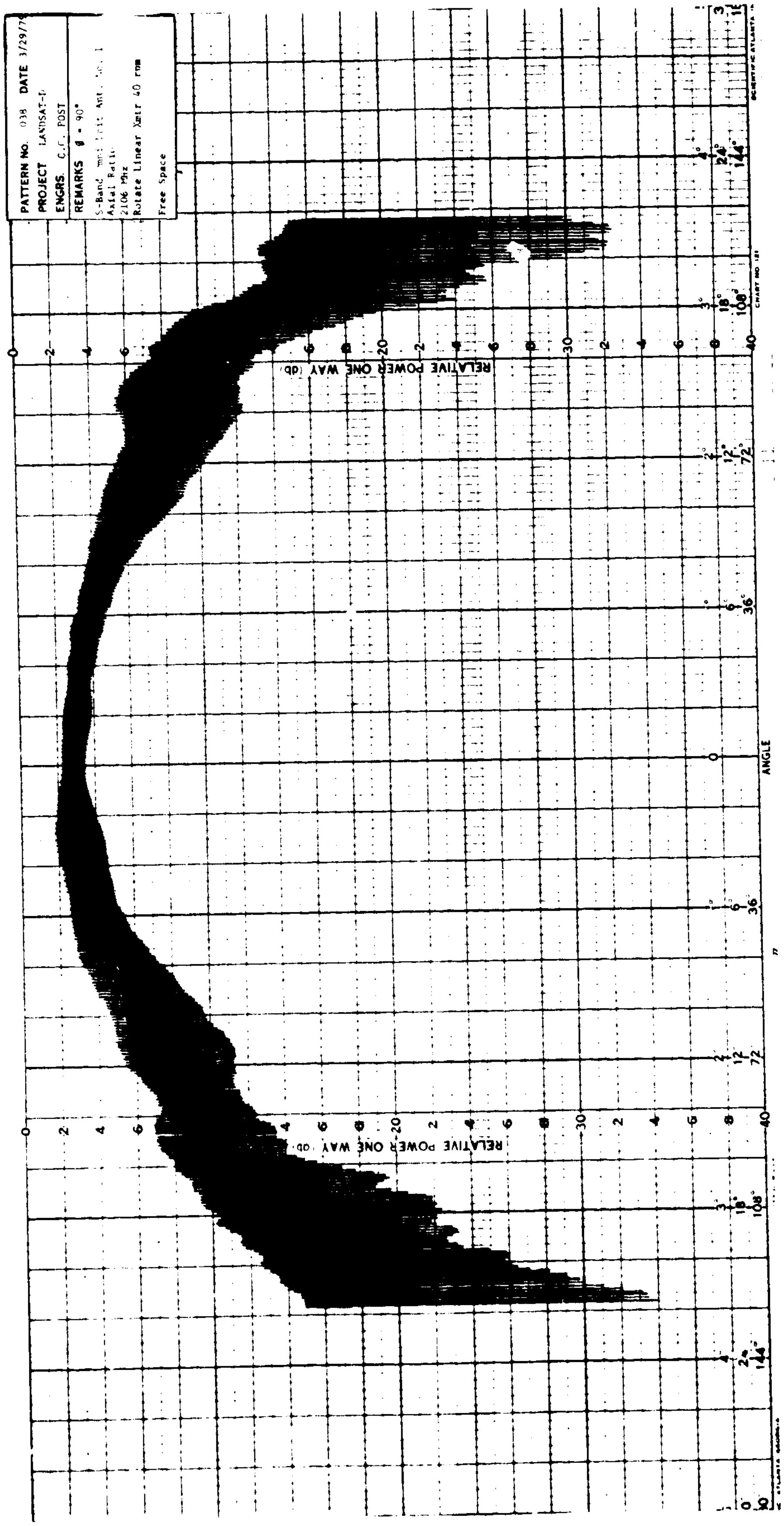

PATTERN NO. 038 DATE 3/29/7
PROJECT LANDSAT-D
ENGRS. C.C. POST
REMARKS φ = 90°
2106 MHz
Rotate Linear Xmtr 40 rpm
Free Space
RELATIVE POWER ONE WAY (db)
ANGLE

Fig. 76

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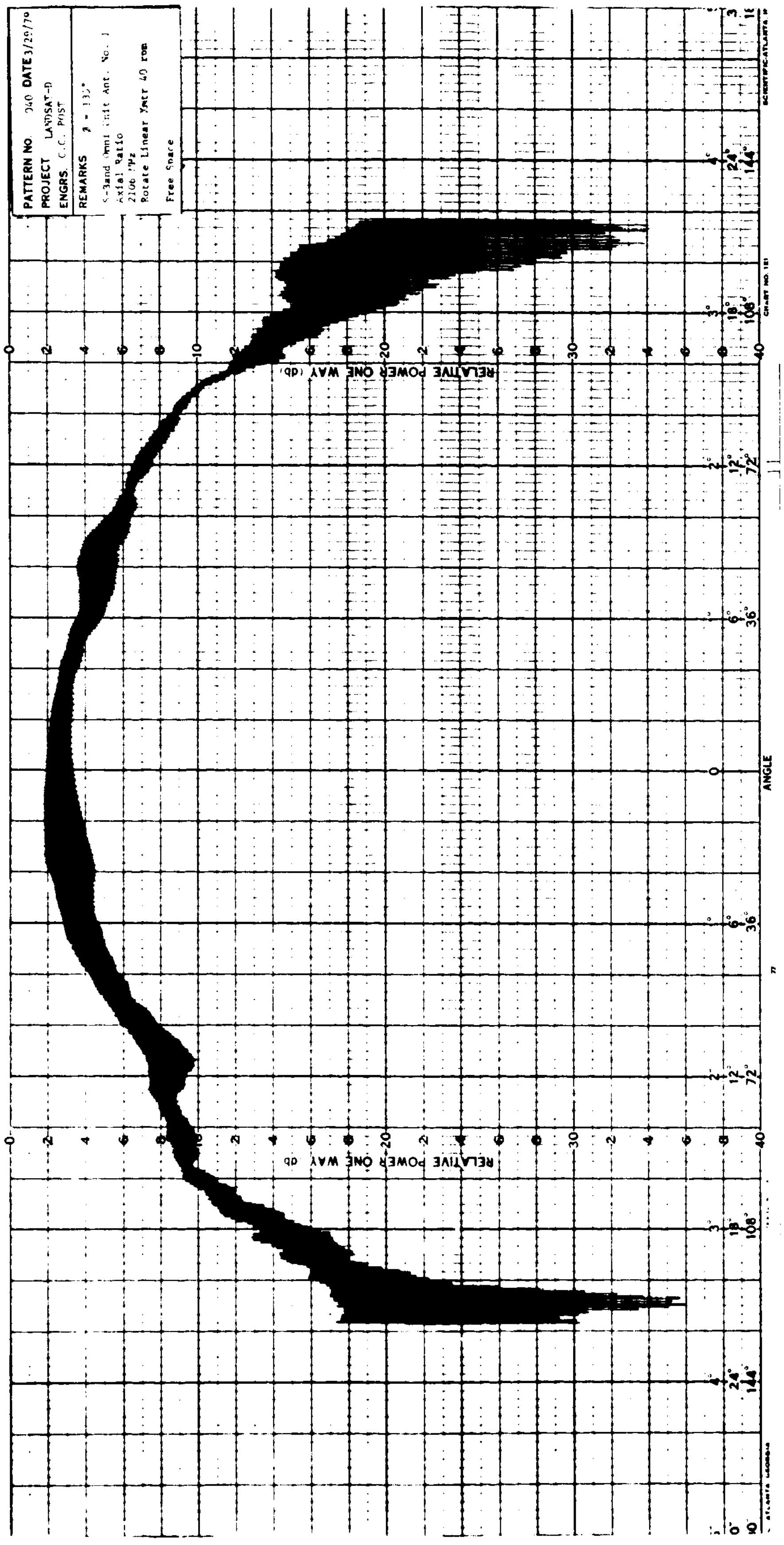

Fig. 77

11.4 S-Band Omni Unit Radiator No. 1 - 2288 MHz

11.4.1 Antenna Patterns - R.C. Polarization

Measured Gain = +3.7 dBi

2288 MHz

Polarization Axial Ratio

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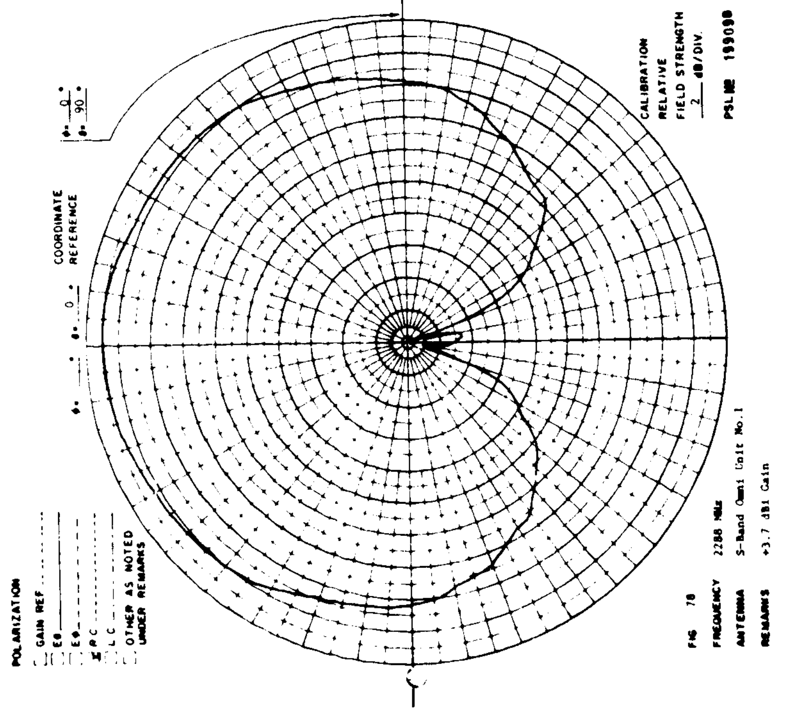

FIG 78
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Unit No.1
REMARKS +3.7 dBi Gain

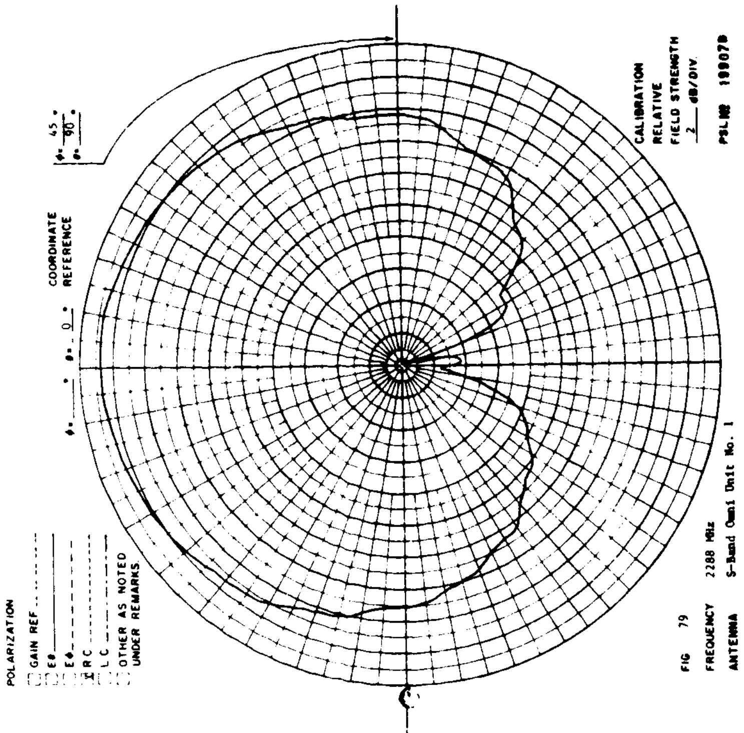

FIG 79
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Unit No. 1
REMARKS

ORIGINAL PAGE IS OF POOR QUALITY

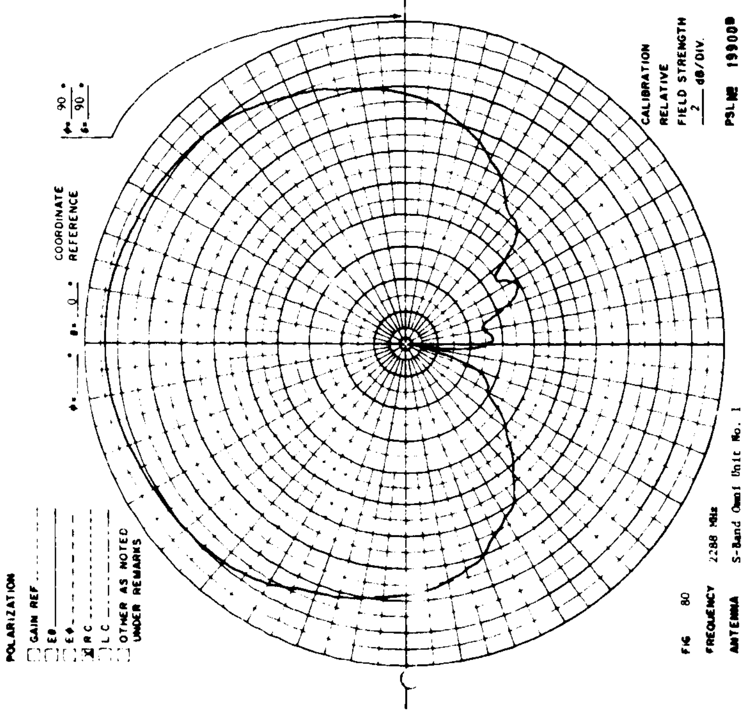

FIG. 80
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Unit No. 1
REMARKS

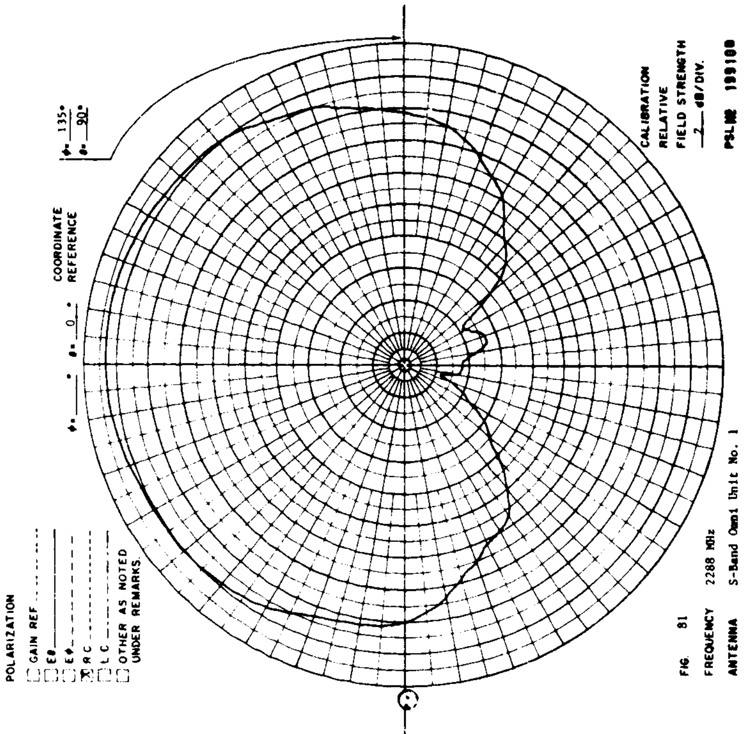

FIG. 81
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Unit No. 1
REMARKS

ORIGINAL PAGE IS OF POOR QUALITY

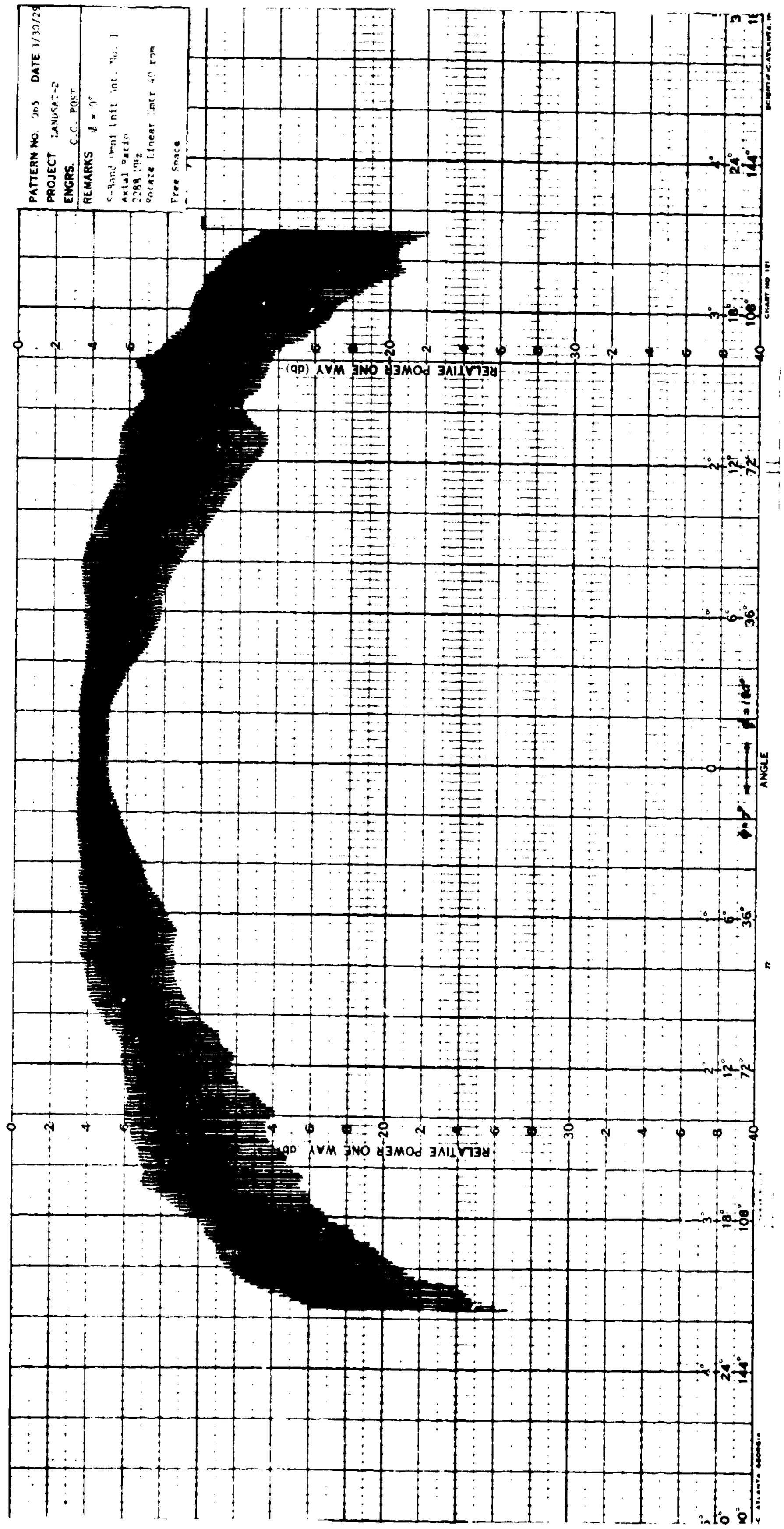

Fig. 82

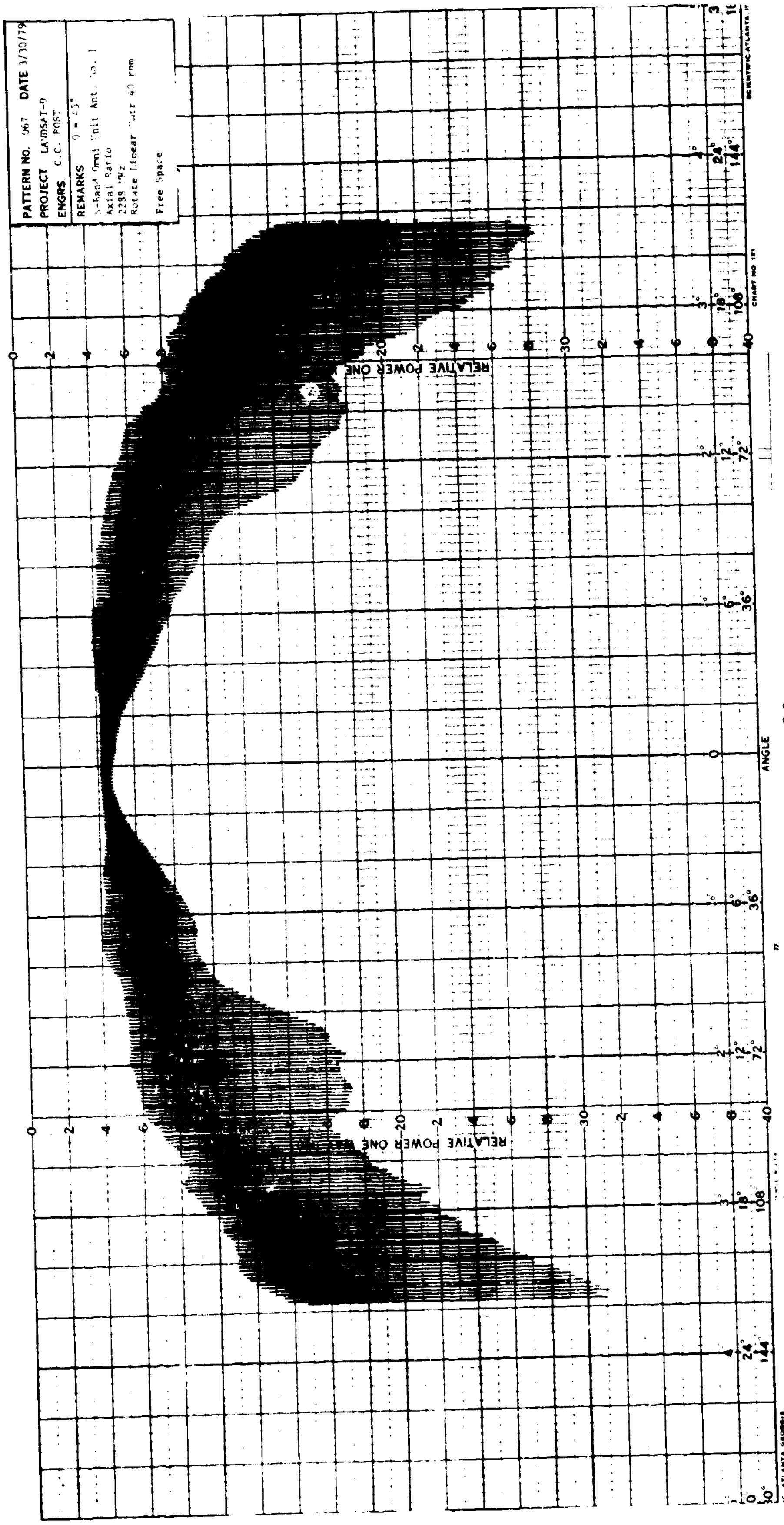
PATTERN NO. 967 DATE 3/30/79
PROJECT LANDSAT-D
ENGRS C.C. POST
REMARKS
Free Space
RELATIVE POWER ONE
ANGLE

Fig. 83

ORIGINAL PAGE IS OF POOR QUALITY

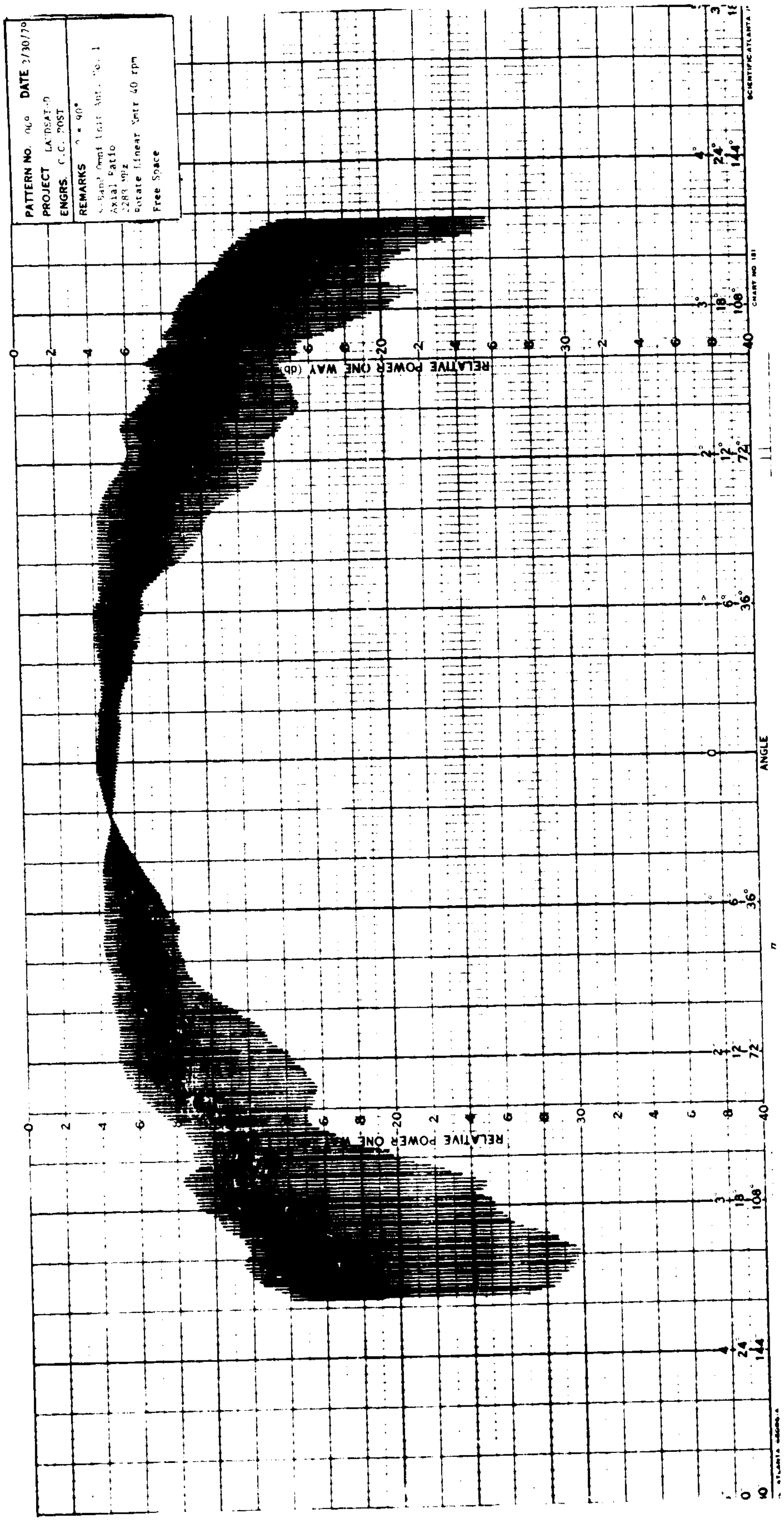

Fig. 84

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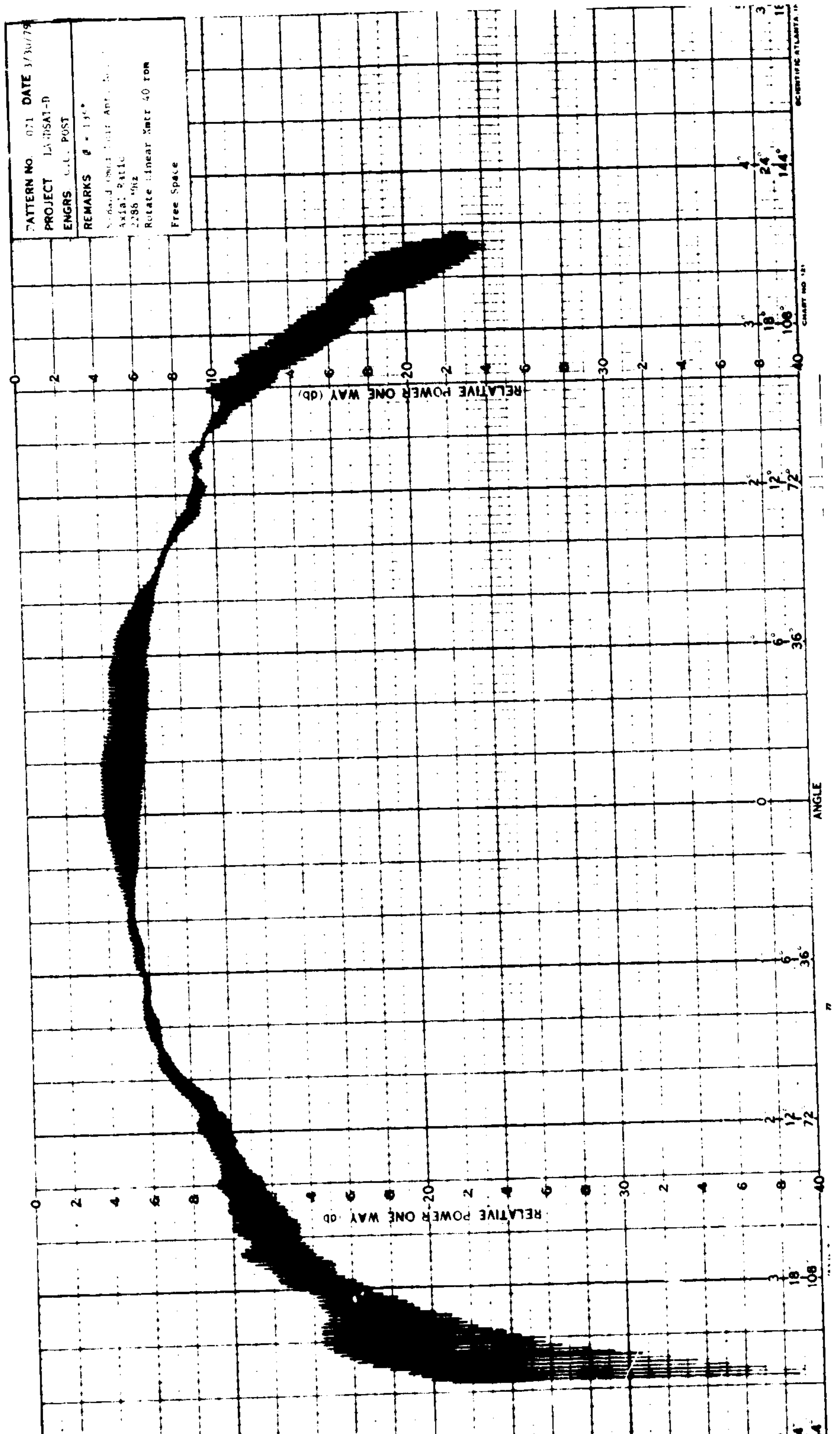


Fig. 85

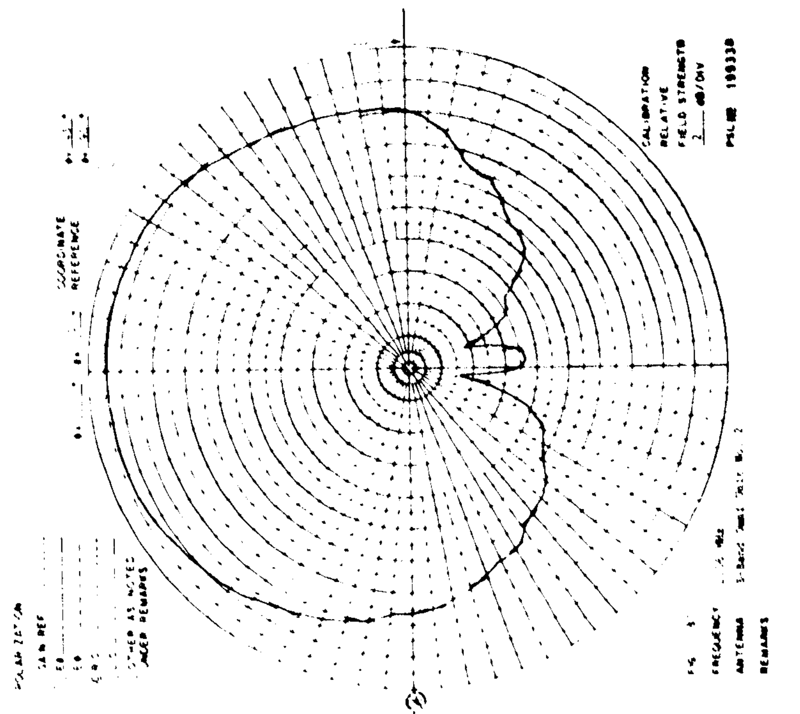
11.5 S-Band Omni Unit Radiator No. 2 - 2106 MHz

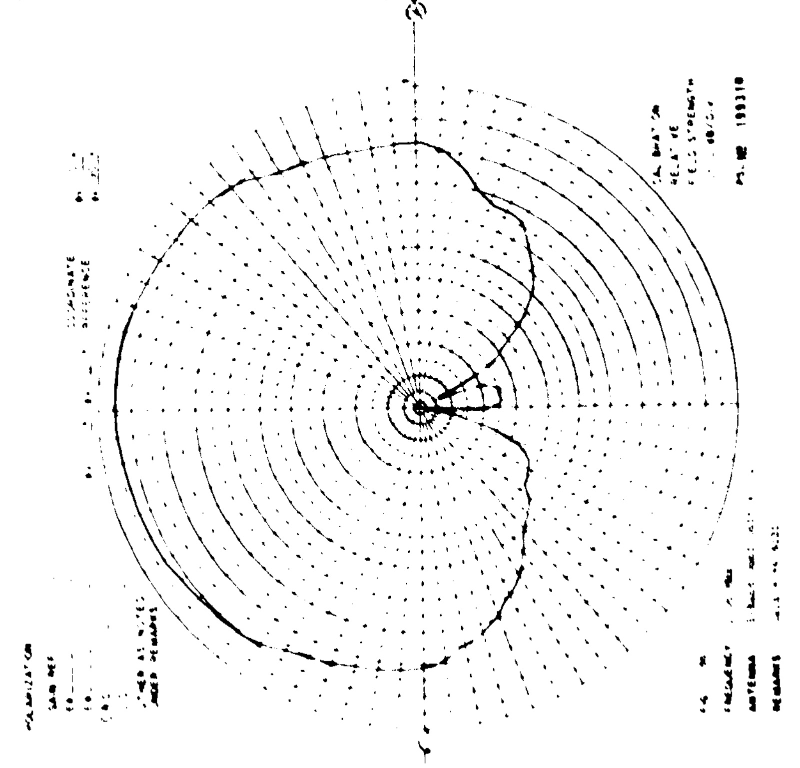
11.5.1 Antenna Patterns - R.C. Polarization

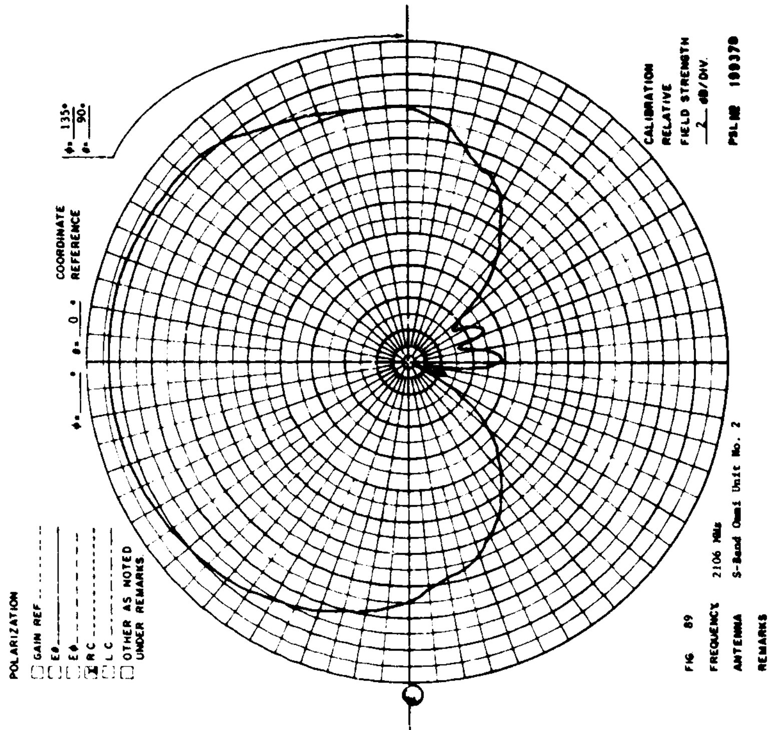
Measured Gain = +4.8 dBi

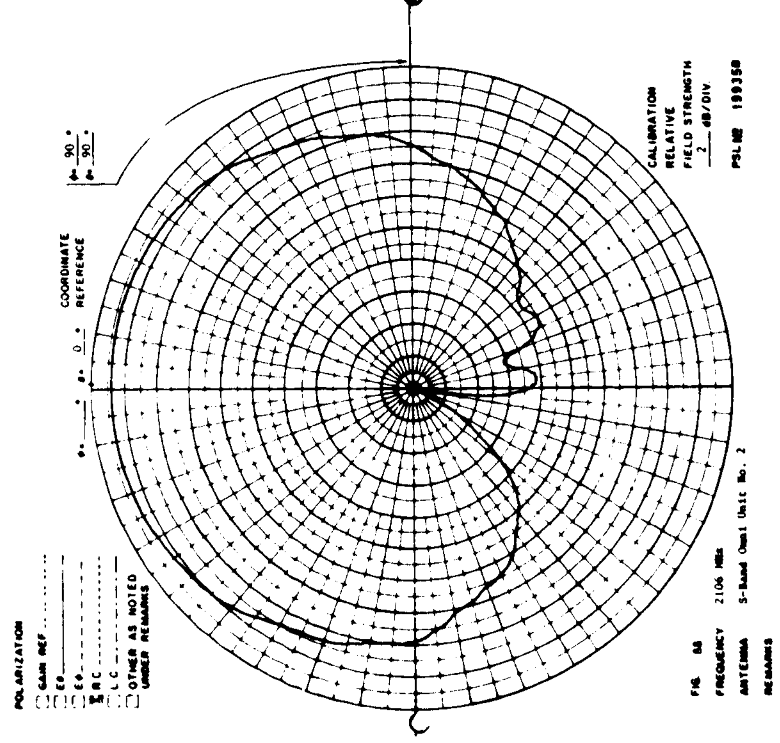
2106 MHz

Polarization Axial Ratio






POLARIZATION
GAIN REF
OTHER AS NOTED
UNDER REMARKS
COORDINATE
REFERENCE
θ = 135°
φ = 90°
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.
PSL № 199370
FIG 89
FREQUENCY 2106 MHz
ANTENNA S-Band Omni Unit No. 2
REMARKS


POLARIZATION
GAIN REF
OTHER AS NOTED
UNDER REMARKS
COORDINATE
REFERENCE
θ = 90°
φ = 90°
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.
PSL № 199358
FIG 88
FREQUENCY 2106 MHz
ANTENNA S-Band Omni Unit No. 2
REMARKS

ORIGINAL PAGE IS OF POOR QUALITY

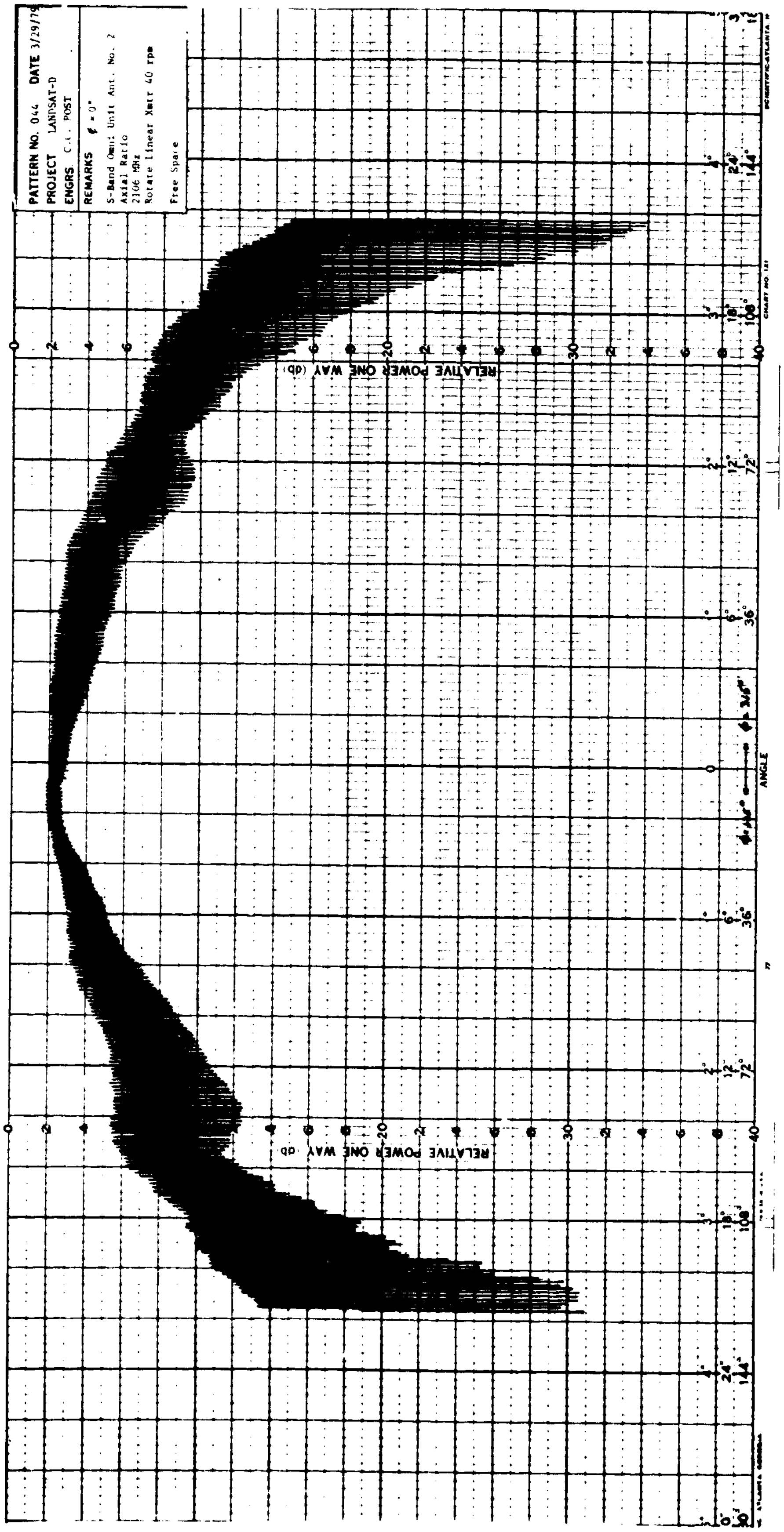


Fig. 90

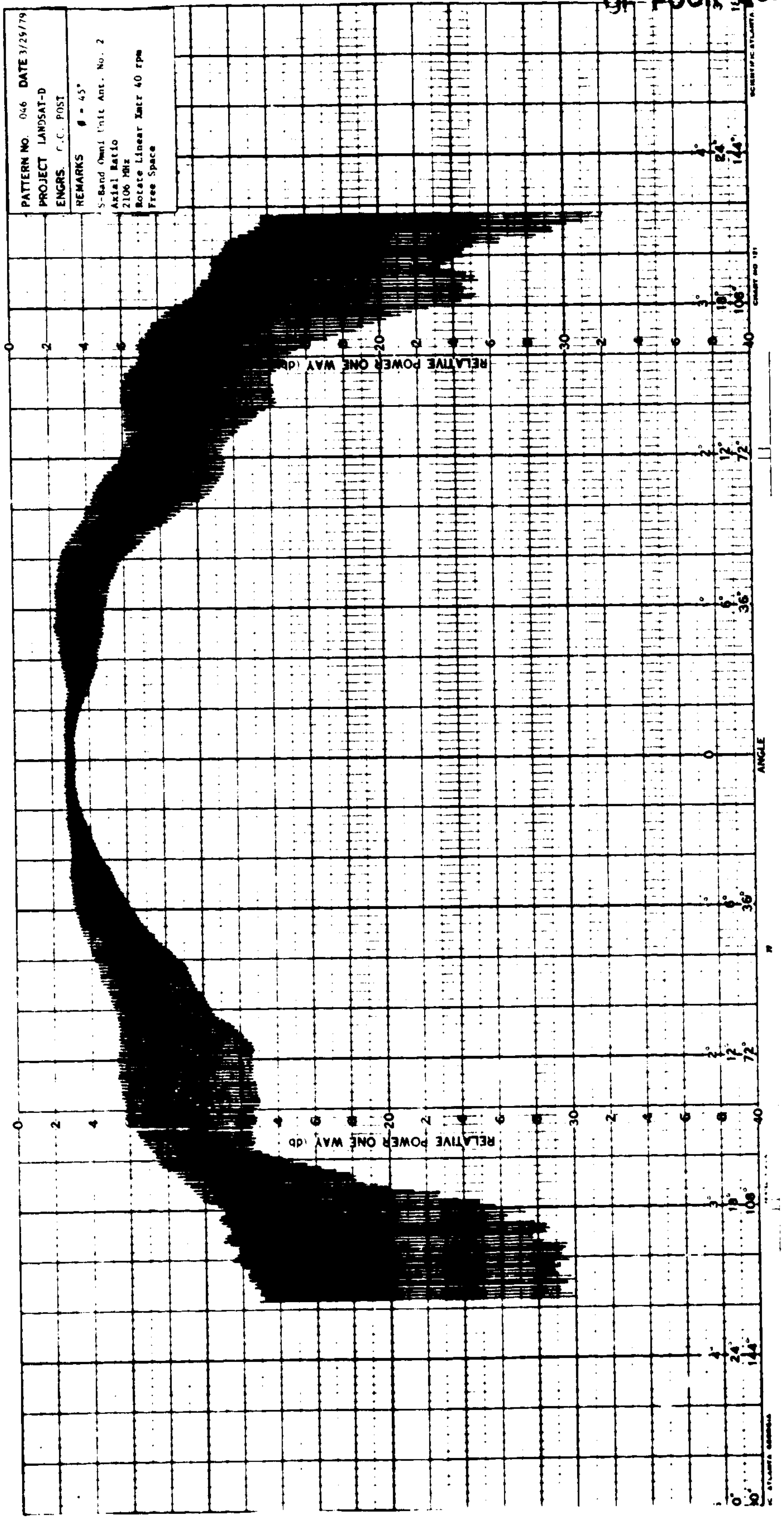

PATTERN NO. 046 DATE 3/29/79
PROJECT LANDSAT-D
ENGRS. C.C. POST
REMARKS φ = 45°
S-Band Omni Unit Ant. No. 2
Axial Ratio
2106 MHz
Rotate Linear Xmtr 40 rpm
Free Space
RELATIVE POWER ONE WAY (db)
ANGLE

Fig. 91

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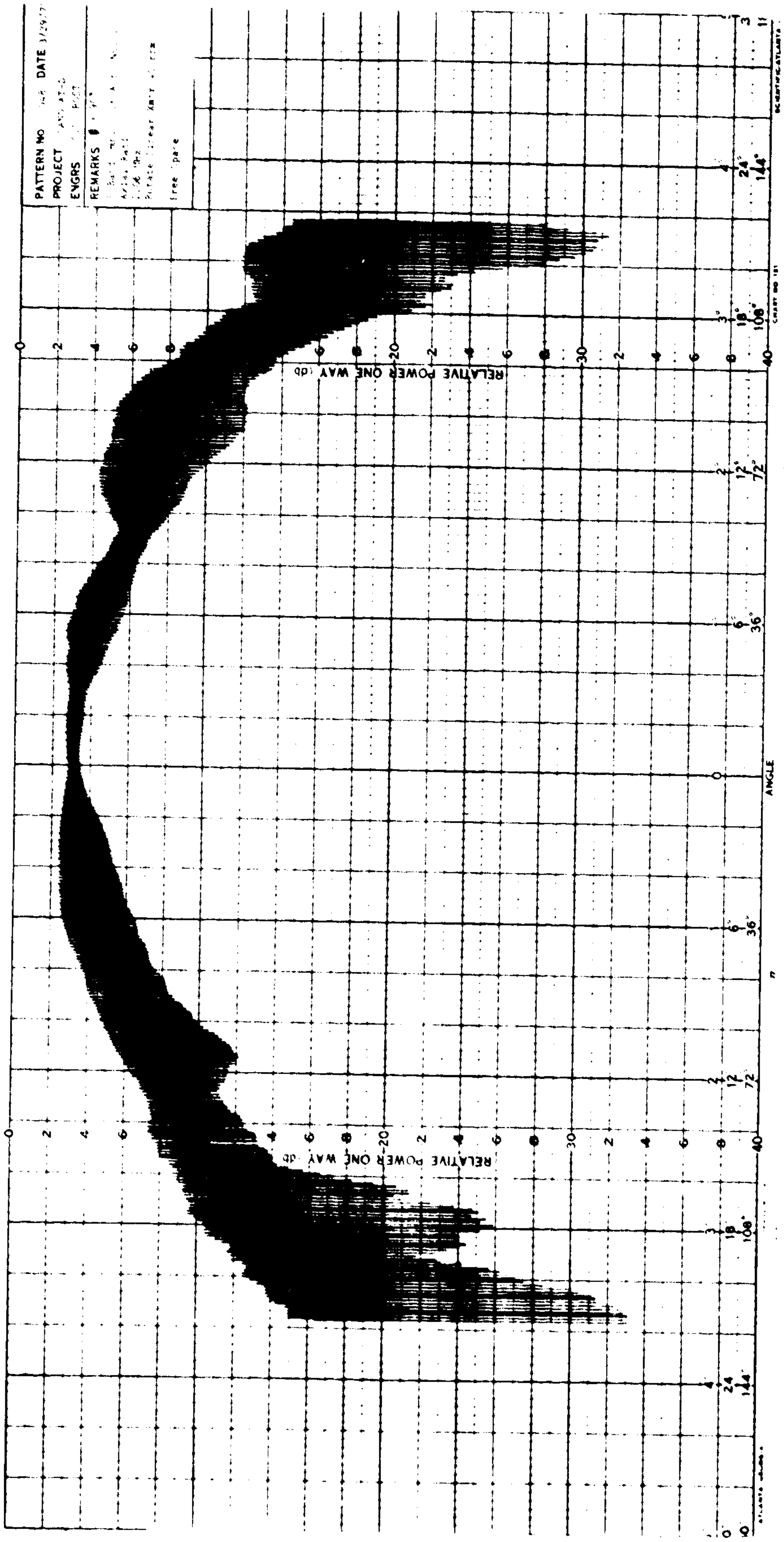

Fig. 92

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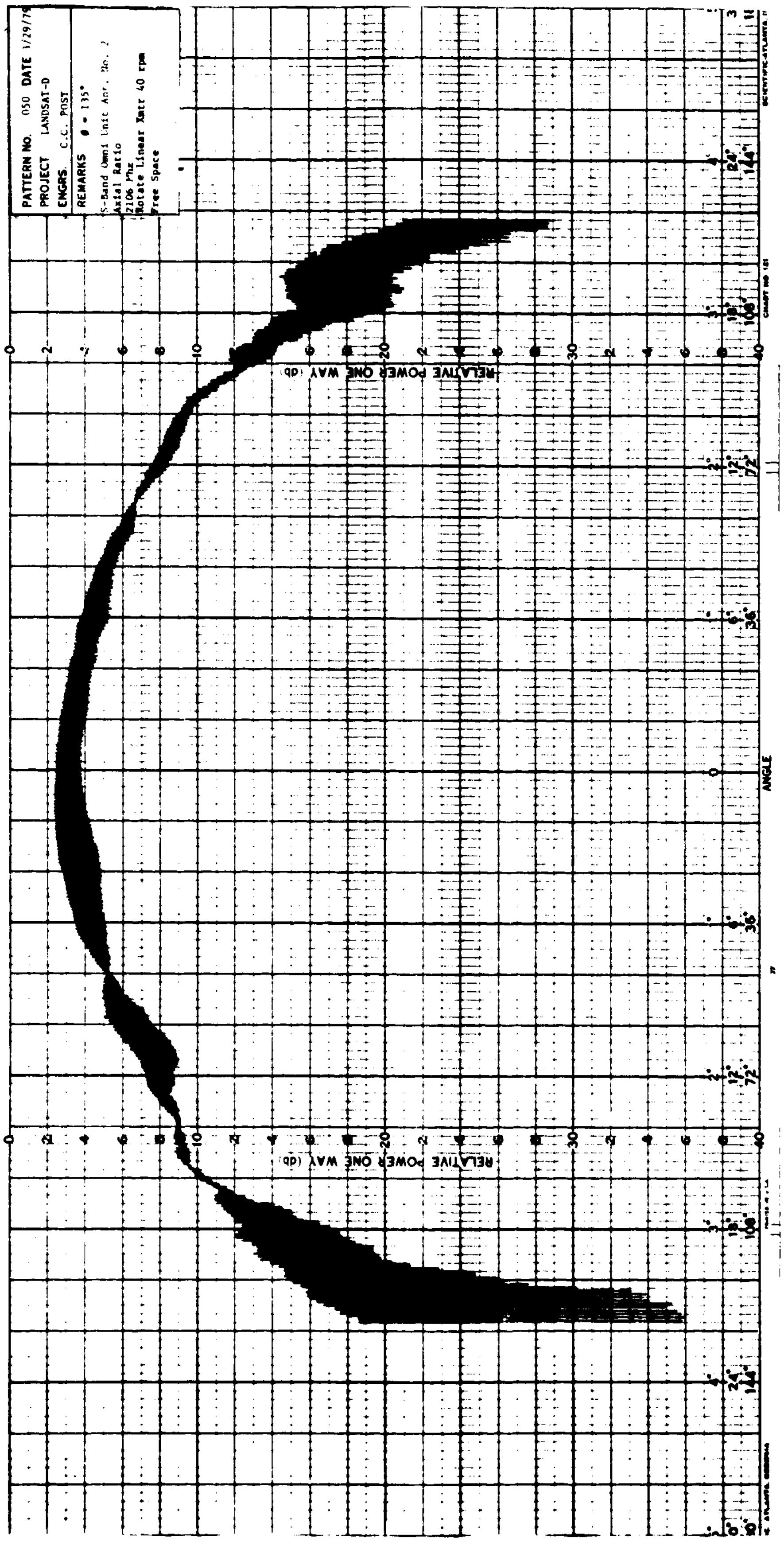


Fig. 93

11.6 S-Band Omni Unit Radiator No. 2 - 2288 MHz

11.6.1 Antenna Patterns - R.C. Polarization

Measured Gain = +3.8 dBi

2288 MHz

Polarization Axial Ratio

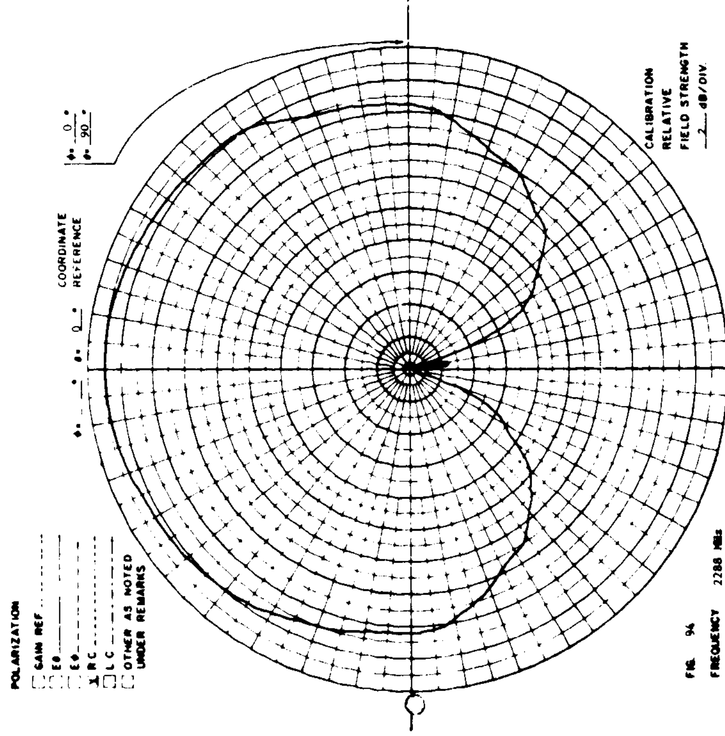


FIG. 94
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Unit No. 2
REMARKS Gain = +3.8 dBi

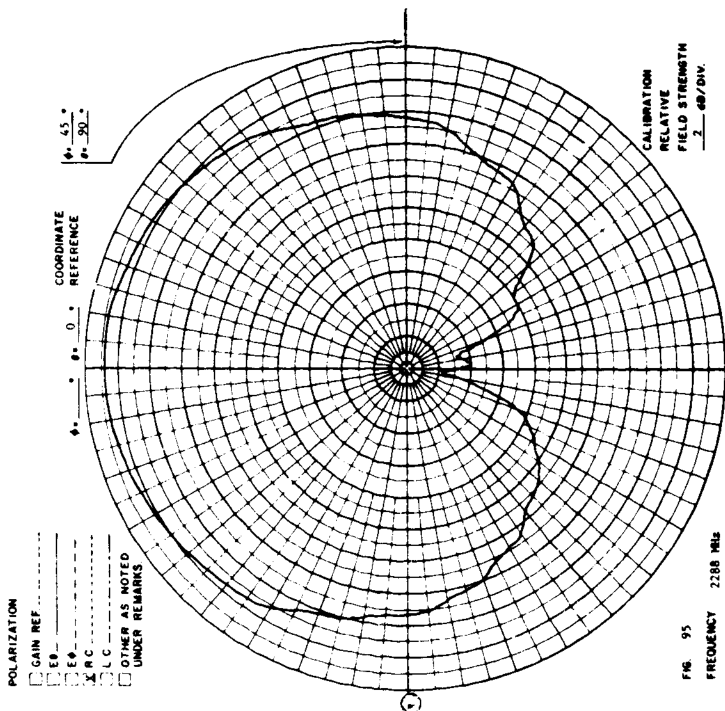
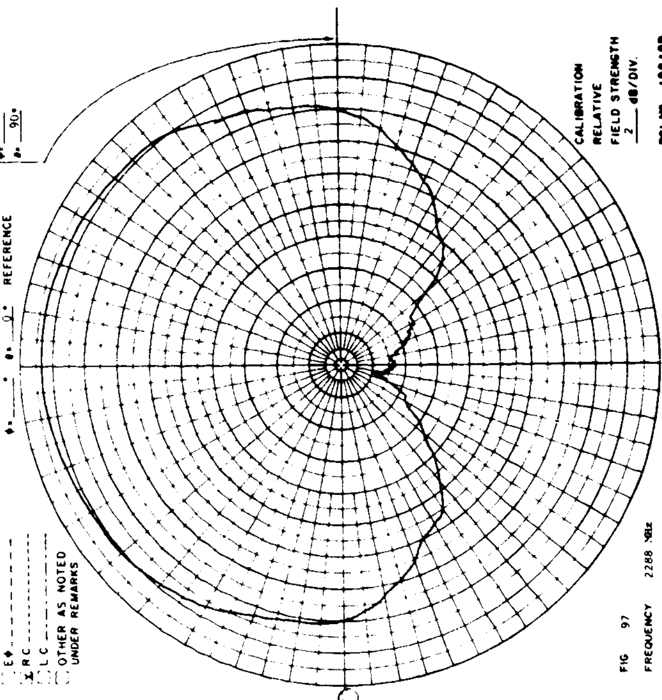


FIG. 95
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Unit No. 2
REMARKS

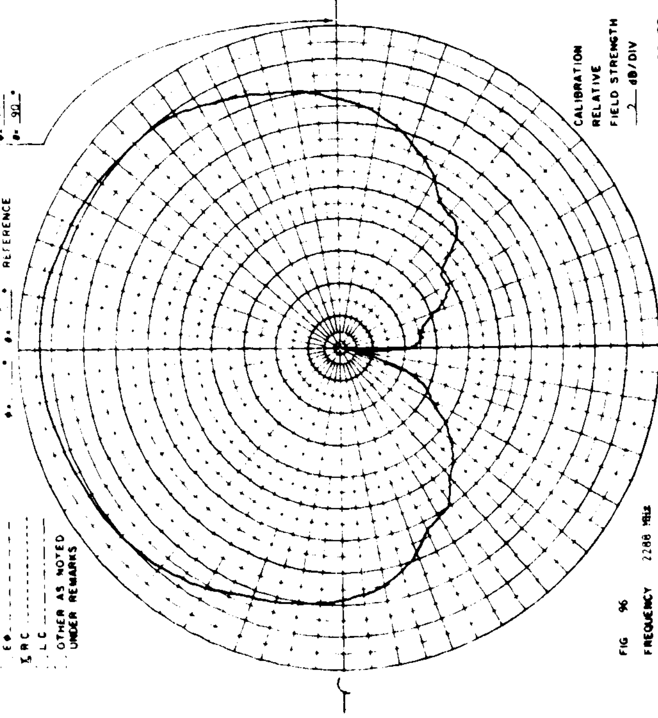


POLARIZATION
GAIN REF
Eθ
Eφ
X RC
LC
OTHER AS NOTED UNDER REMARKS

COORDINATE REFERENCE θ= ___° φ= 0°
φ= 135° θ= 90°

CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.
PSL №

FIG 97
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Unit No. 2
REMARKS



POLARIZATION
GAIN REF
Eθ
Eφ
X RC
LC
OTHER AS NOTED UNDER REMARKS

COORDINATE REFERENCE
φ= 90° θ= 90°

CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
PSL №

FIG 96
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Unit No. 2
REMARKS

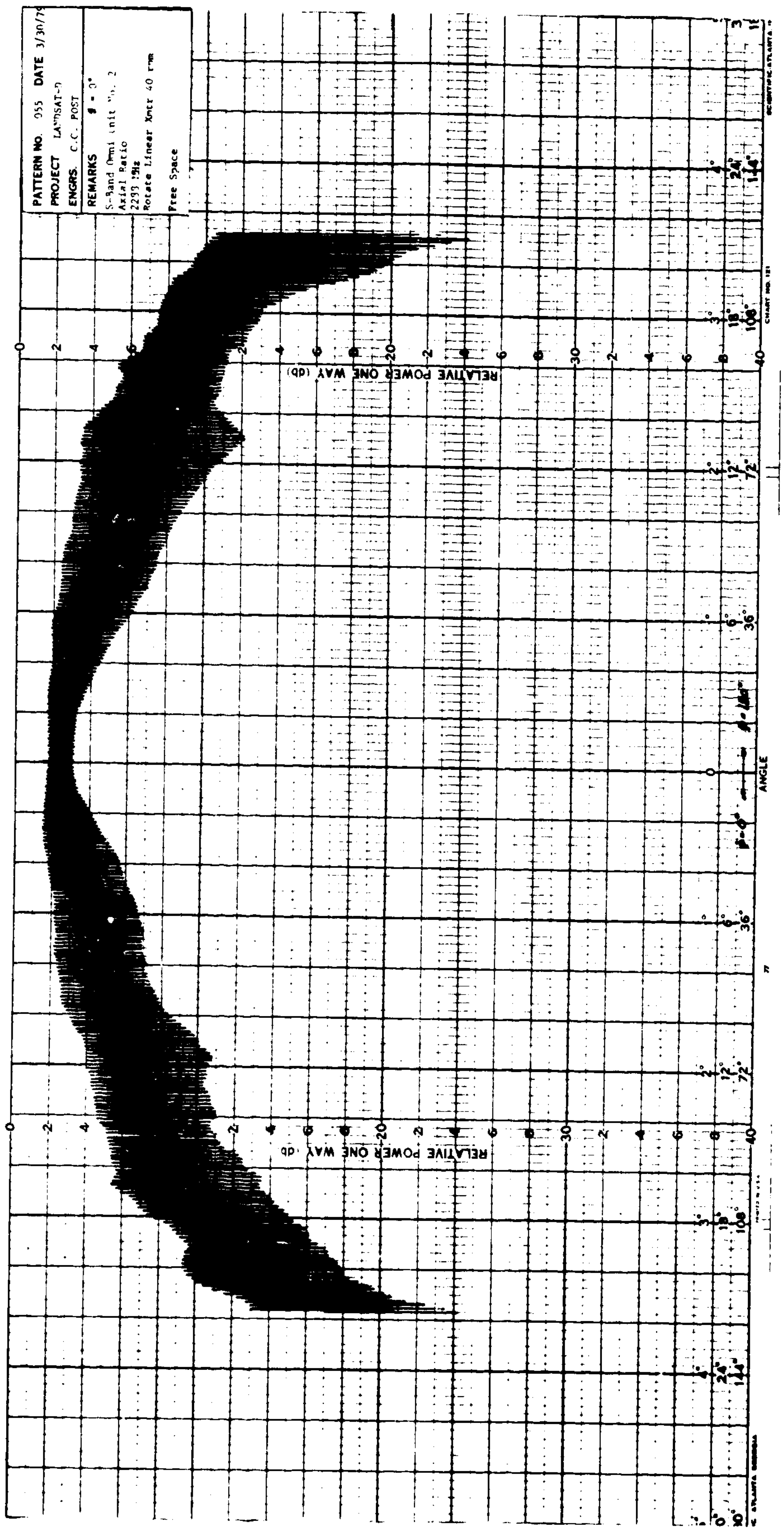

PATTERN NO.
DATE
PROJECT
ENGRS.
REMARKS
Axial Ratio
Free Space
RELATIVE POWER ONE WAY (db)
ANGLE

Fig. 98

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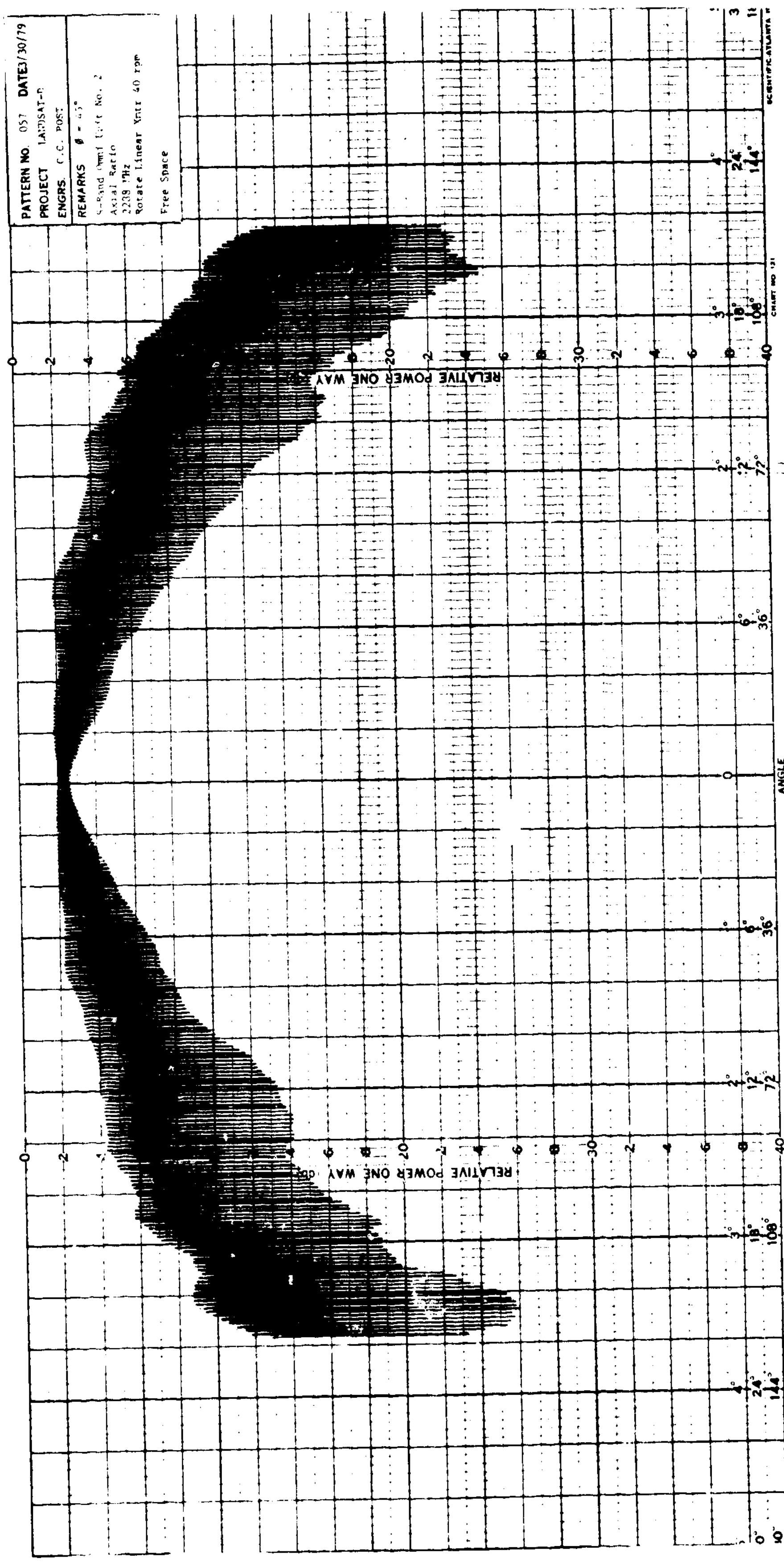

Fig. 99

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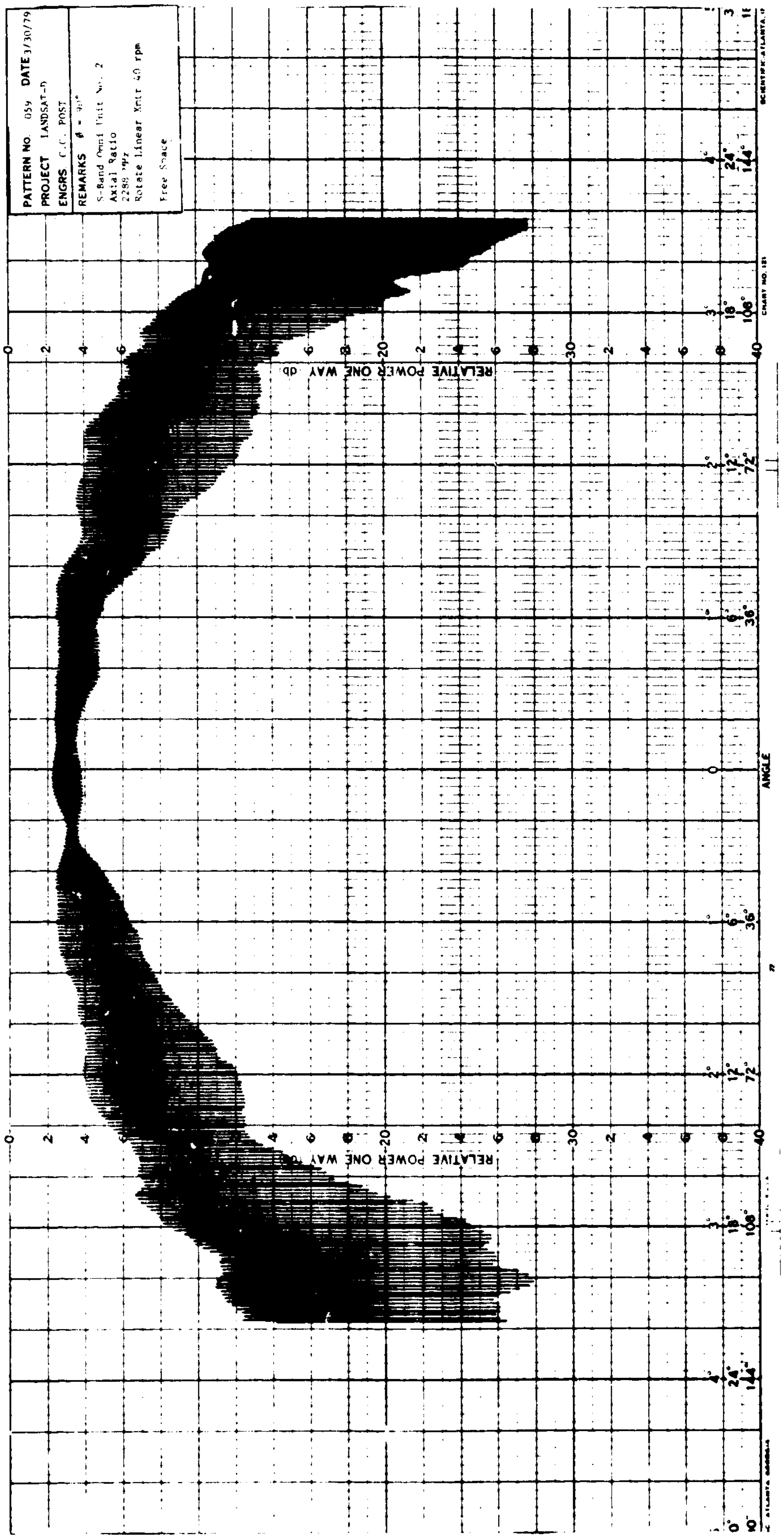

Fig. 100

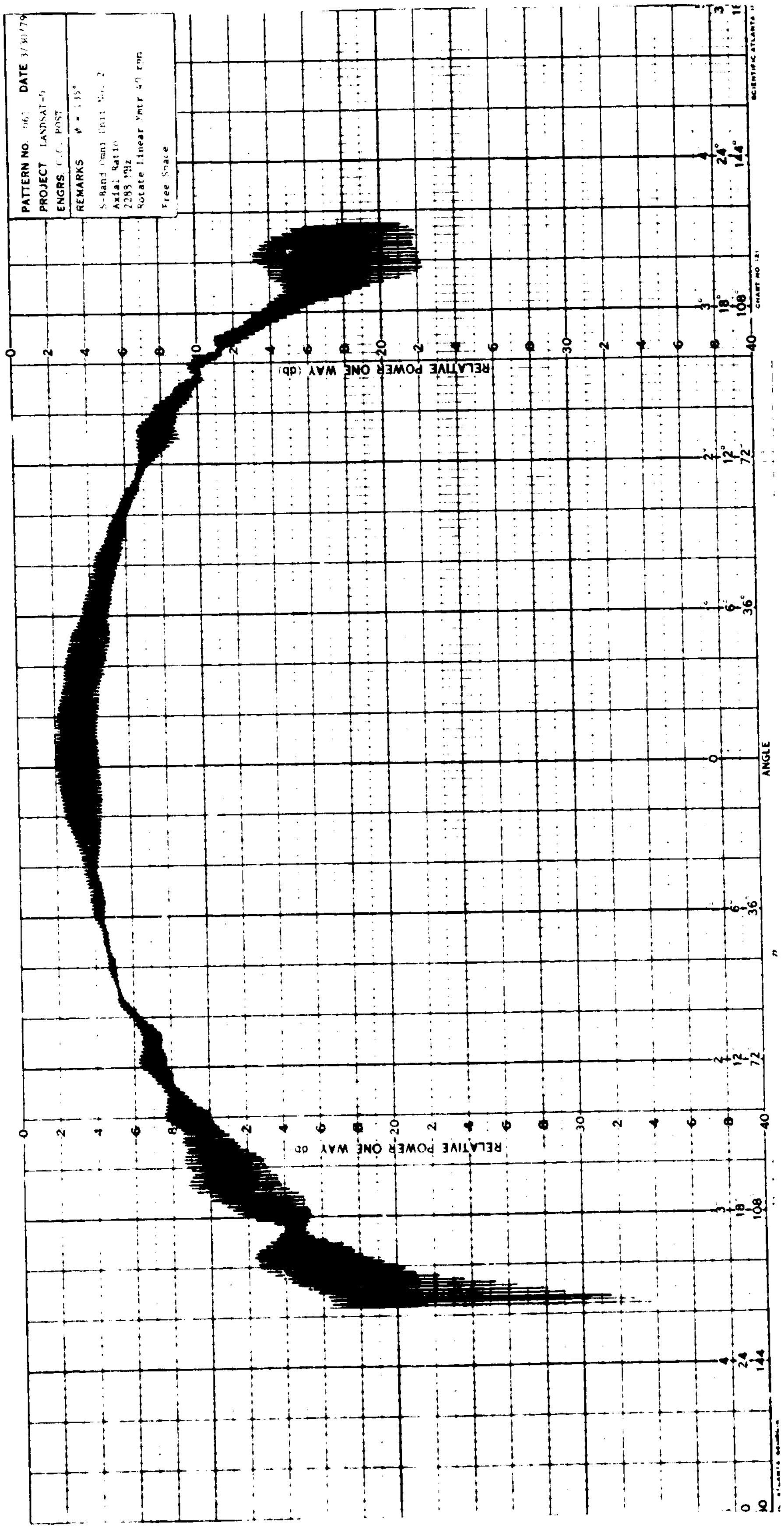

Fig. 101

11.7 S-Band Shaped Beam No. 1 - 2266 MHz

11.7.1 Antenna Patterns - R.C. Polarization

Measured Gain = +3.9 dBi

2266 MHz

Polarization Axial Ratio

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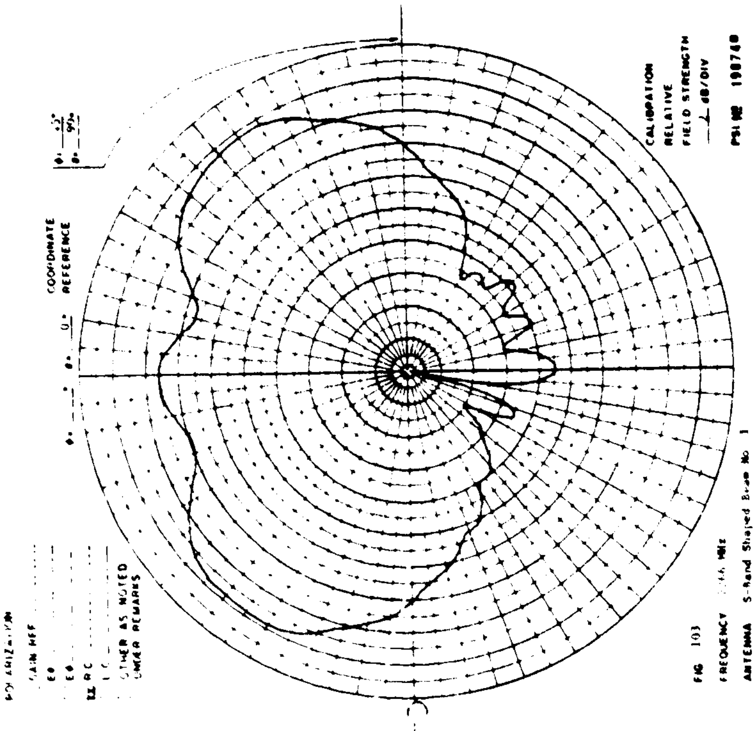
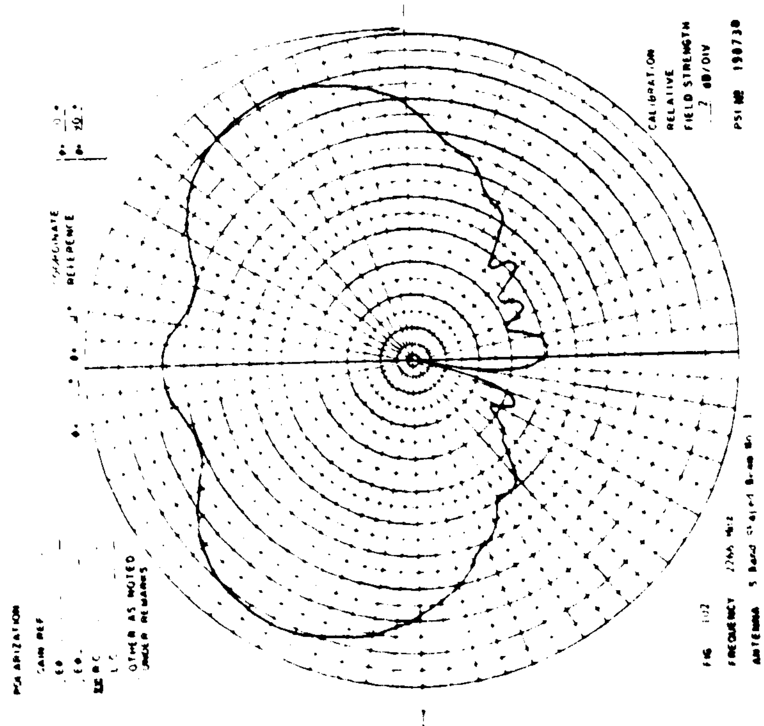
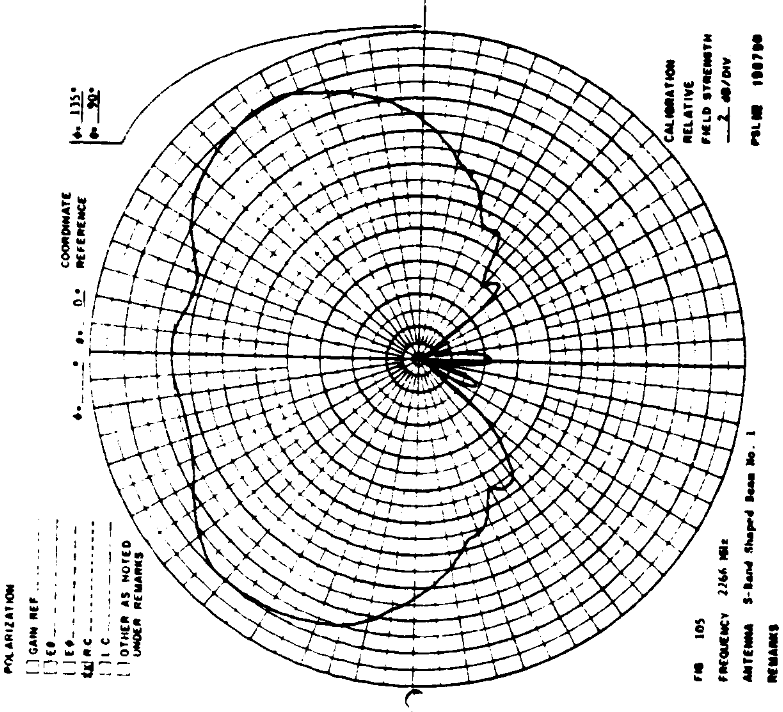
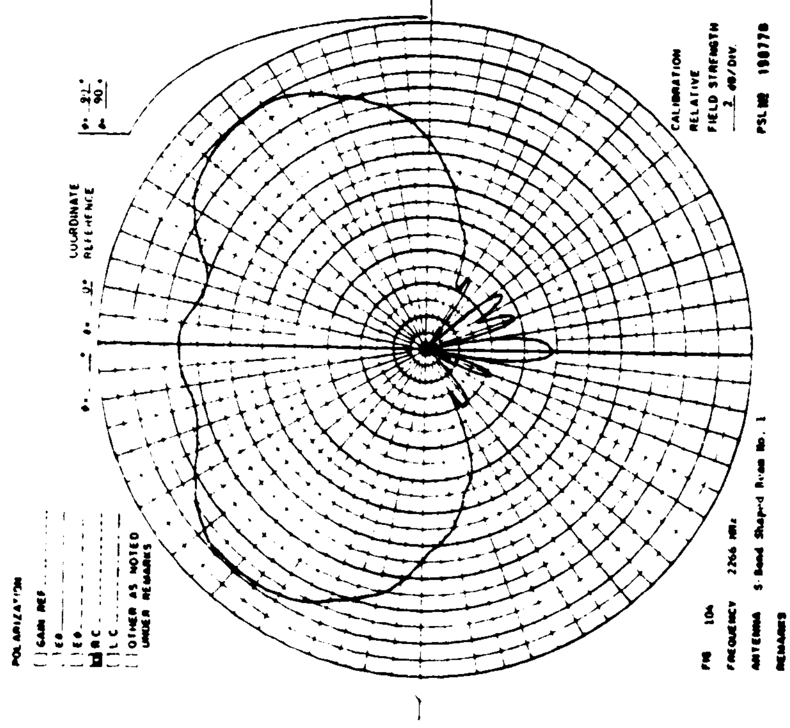





POLARIZATION
GAIN REF
RC
LC
OTHER AS NOTED UNDER REMARKS
COORDINATE REFERENCE
θ= 135°
φ= 90°
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
FIG 105
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 1
REMARKS


POLARIZATION
GAIN REF
RC
LC
OTHER AS NOTED UNDER REMARKS
COORDINATE REFERENCE
θ= 90°
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.
FIG 104
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 1
REMARKS

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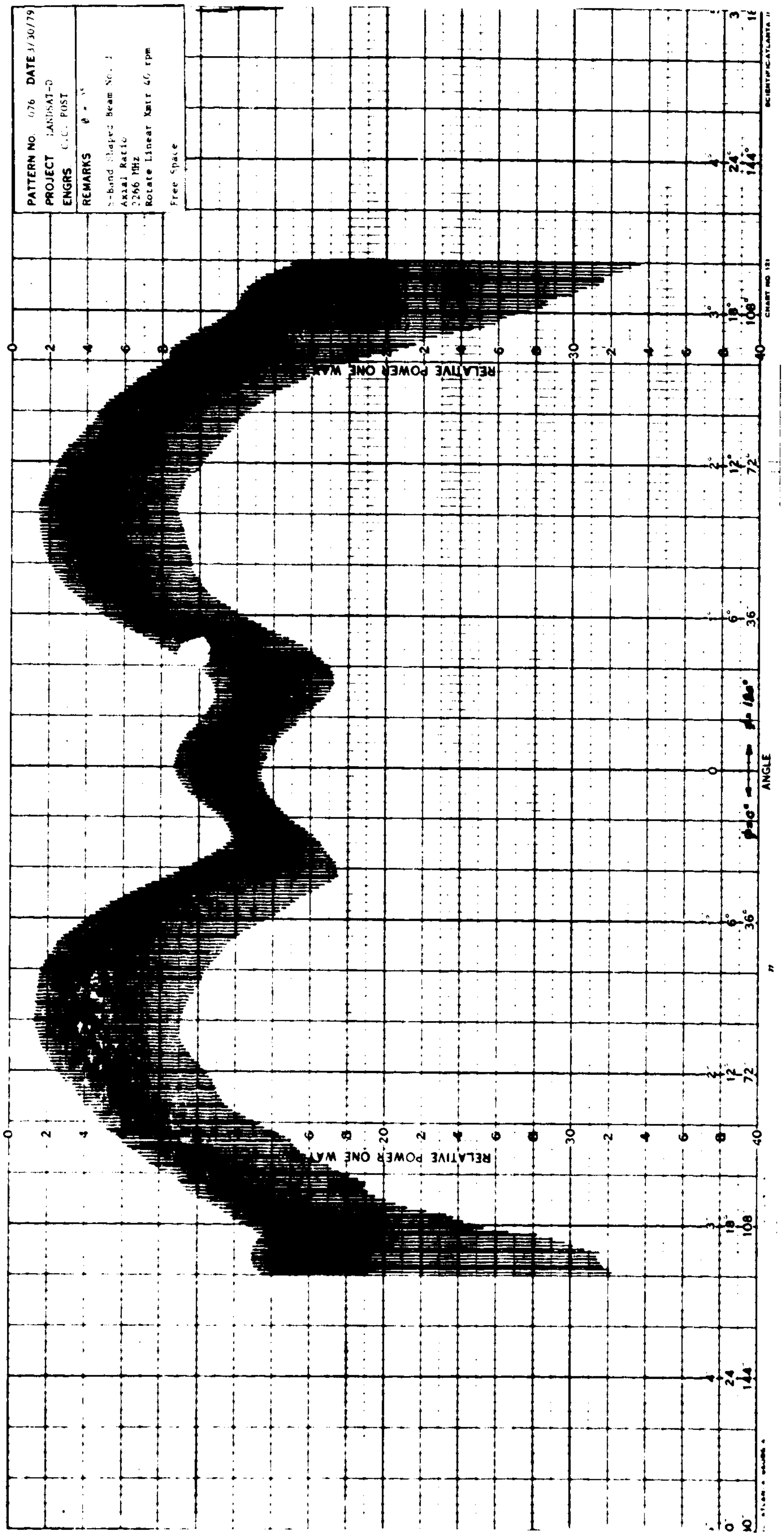

Fig. 106

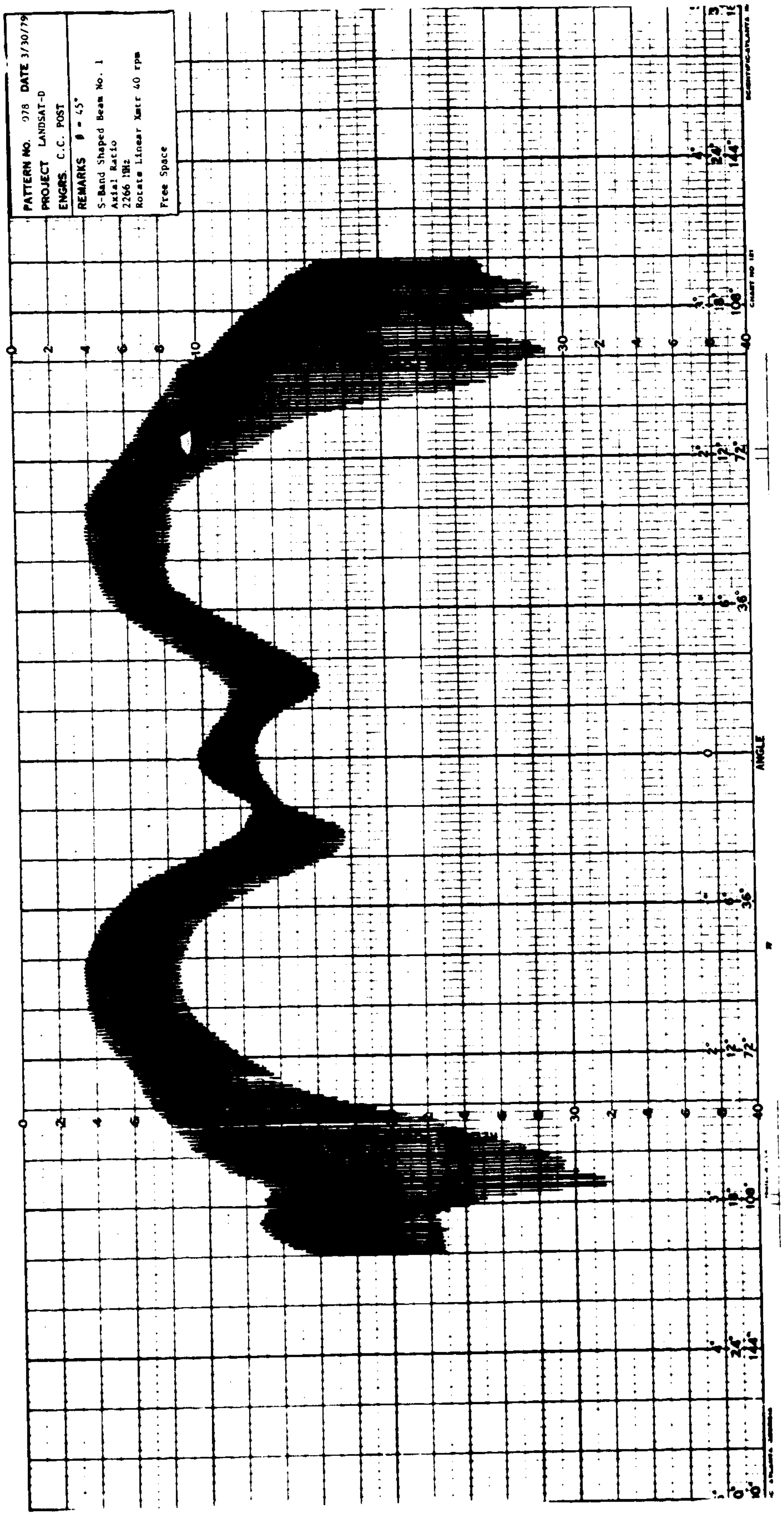
PATTERN NO. 978 DATE 3/30/79
PROJECT LANDSAT-D
ENGRS. C.C. POST
REMARKS φ = 45°
S-Band Shaped Beam No. 1
Axial Ratio
2266 MHz
Rotate Linear Xmtr 40 rpm
Free Space
ANGLE

Fig. 107

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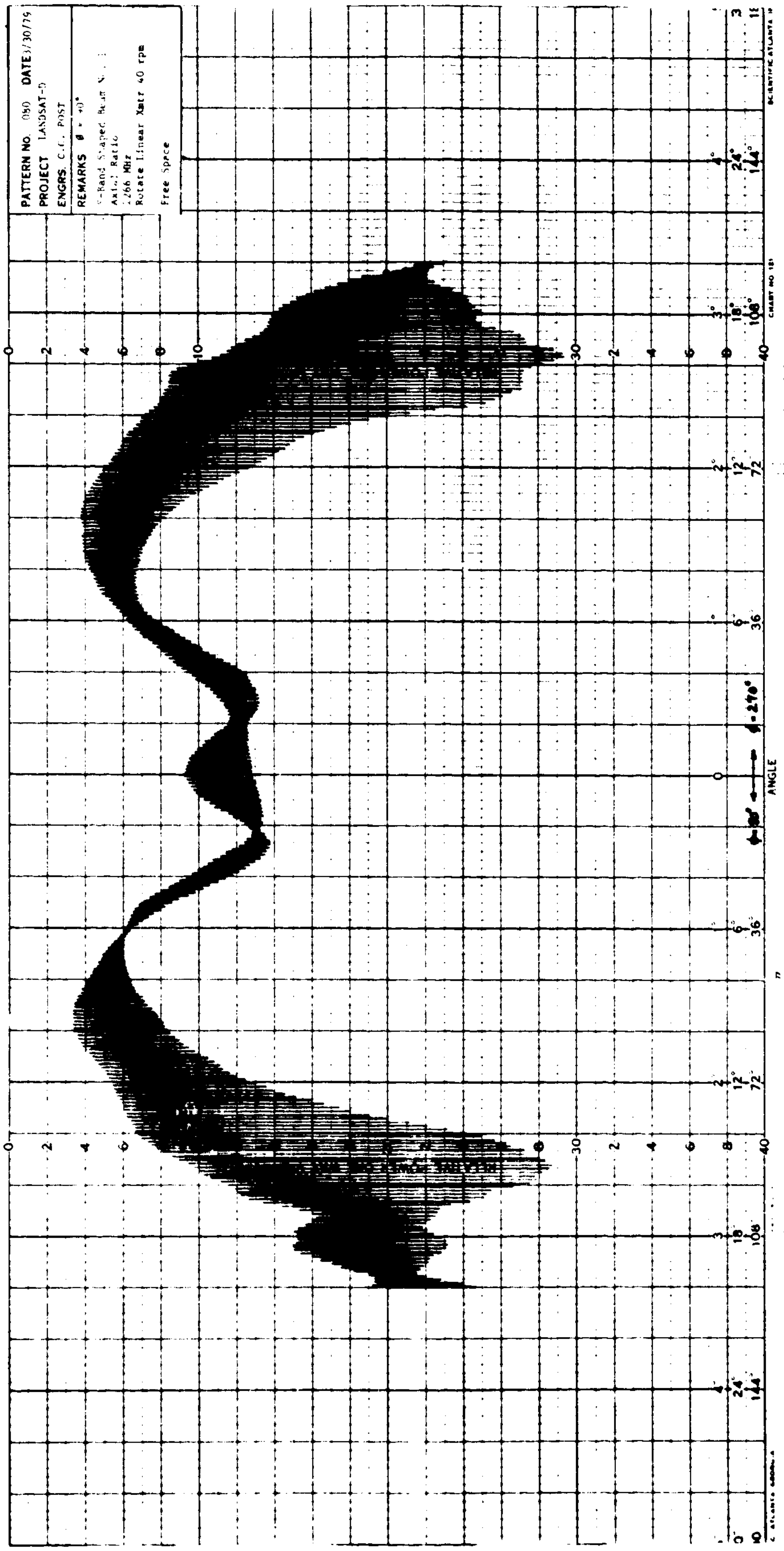

Fig. 108

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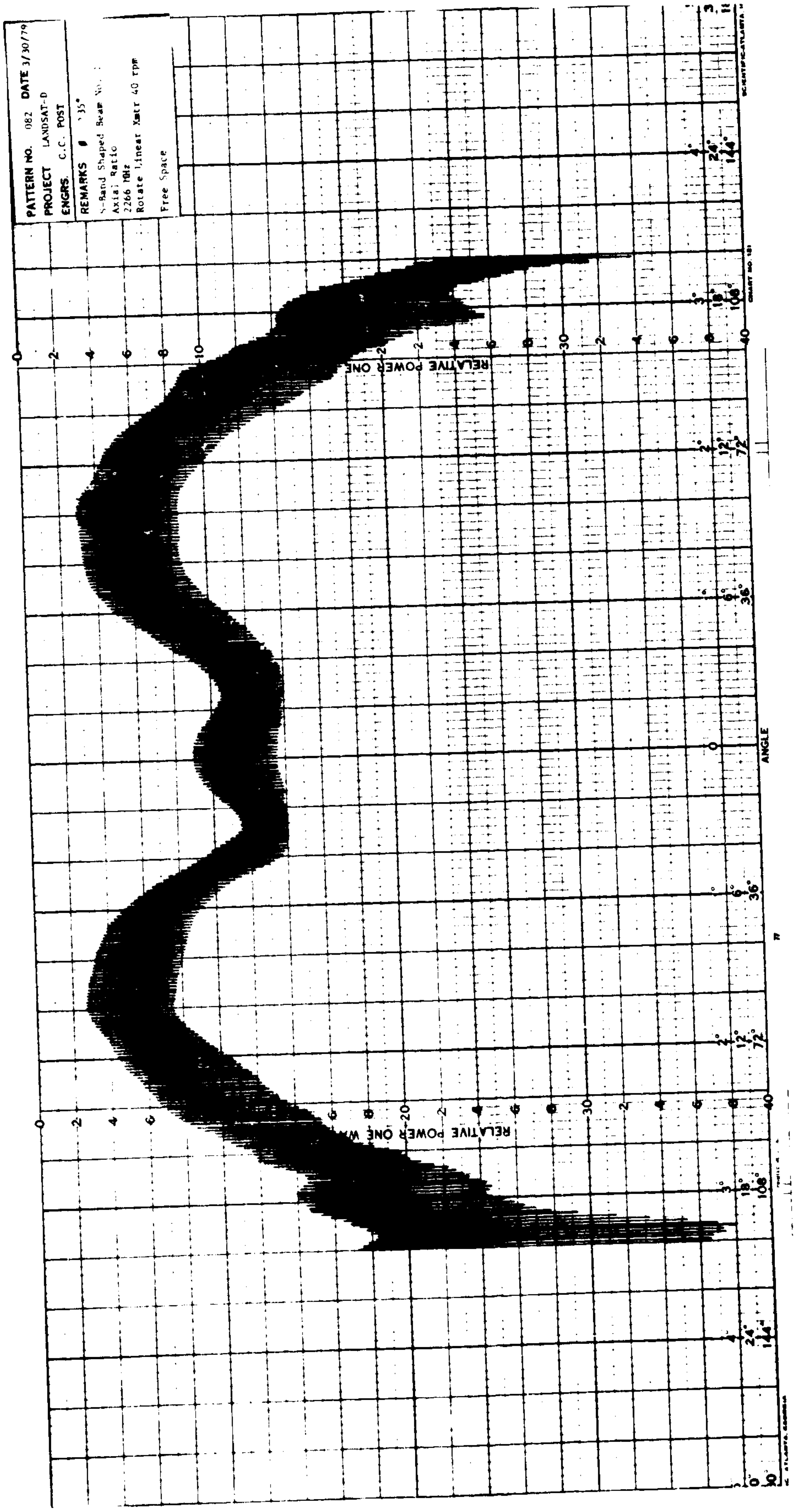

Fig. 109

11.8 S-Band Shaped Beam No. 2 - 2266 MHz

11.8.1 Antenna Patterns - R.C. Polarization

Measured Gain = +3.7 dBi

2266 MHz

Polarization Axial Ratio

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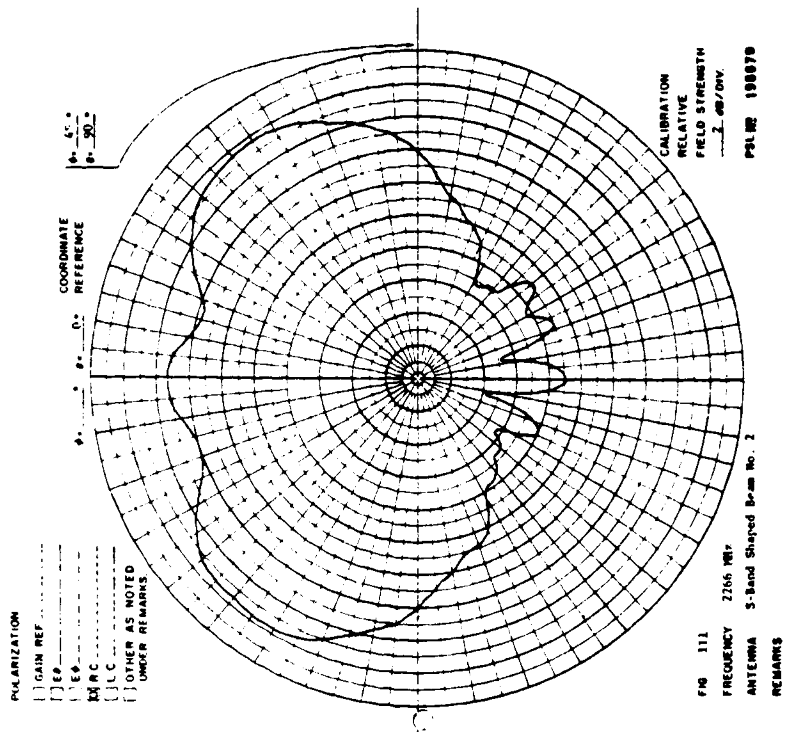
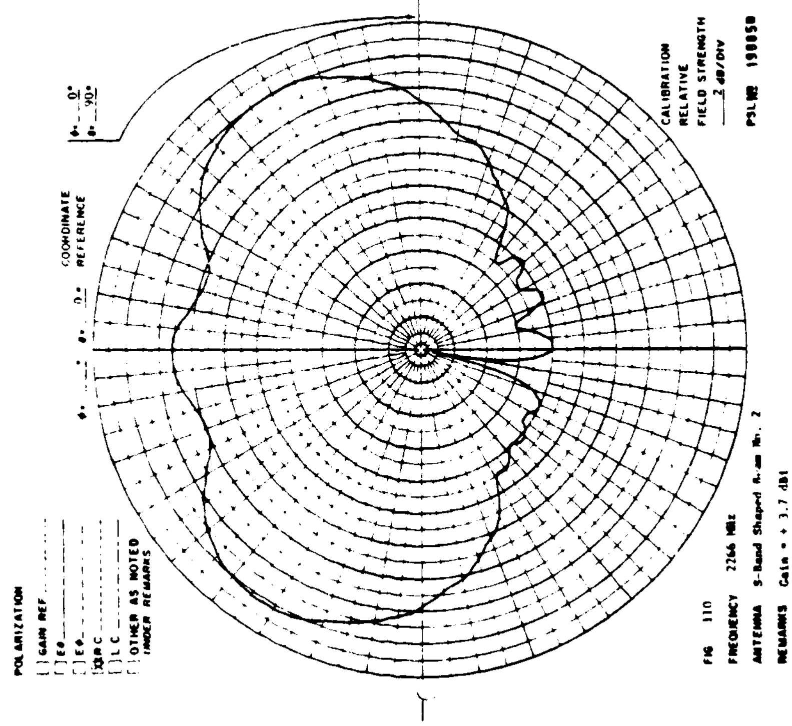
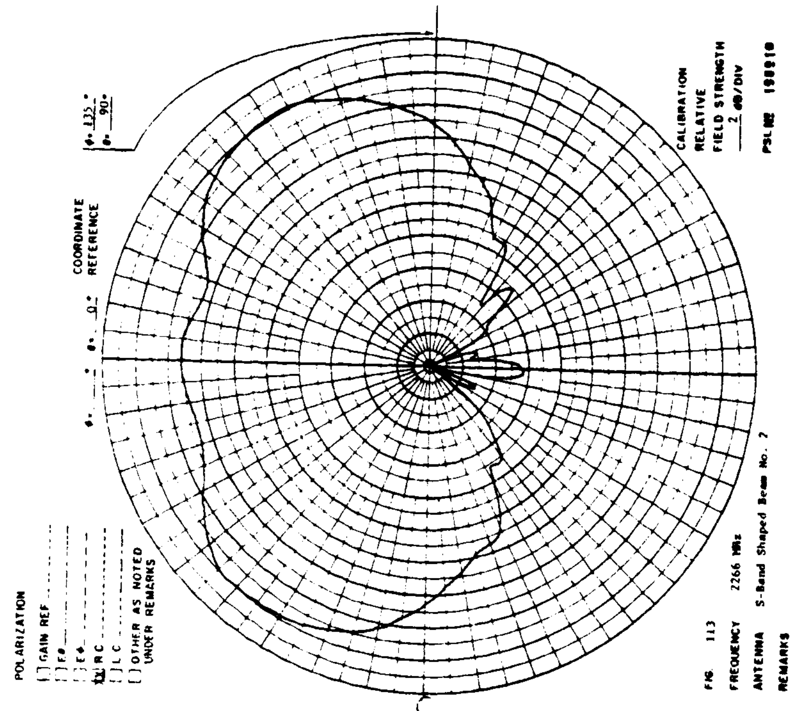
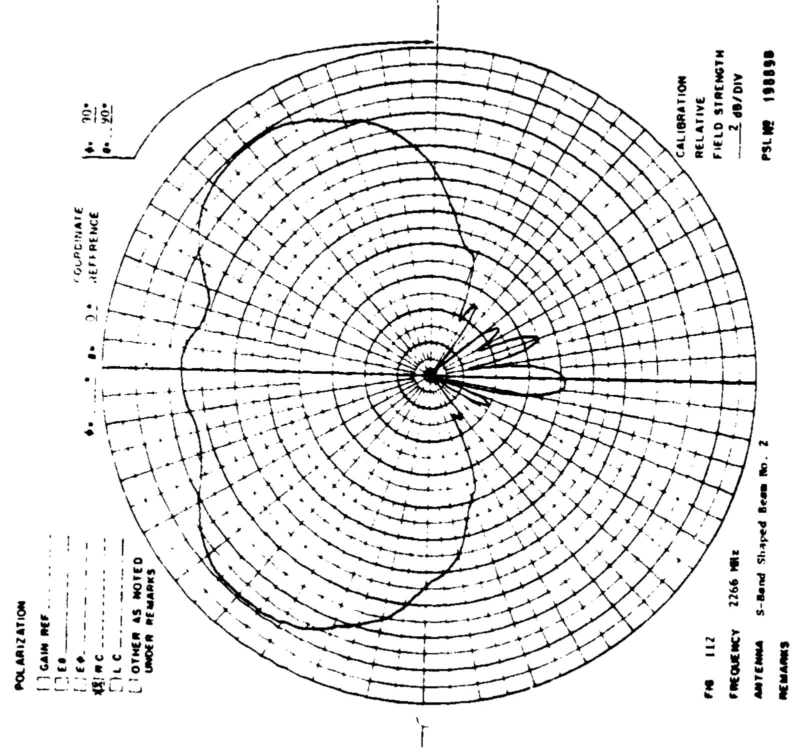





POLARIZATION
GAIN REF
OTHER AS NOTED UNDER REMARKS
COORDINATE REFERENCE
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
FIG 113
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 2
REMARKS


POLARIZATION
GAIN REF
OTHER AS NOTED UNDER REMARKS
COORDINATE REFERENCE
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
FIG 112
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 2
REMARKS

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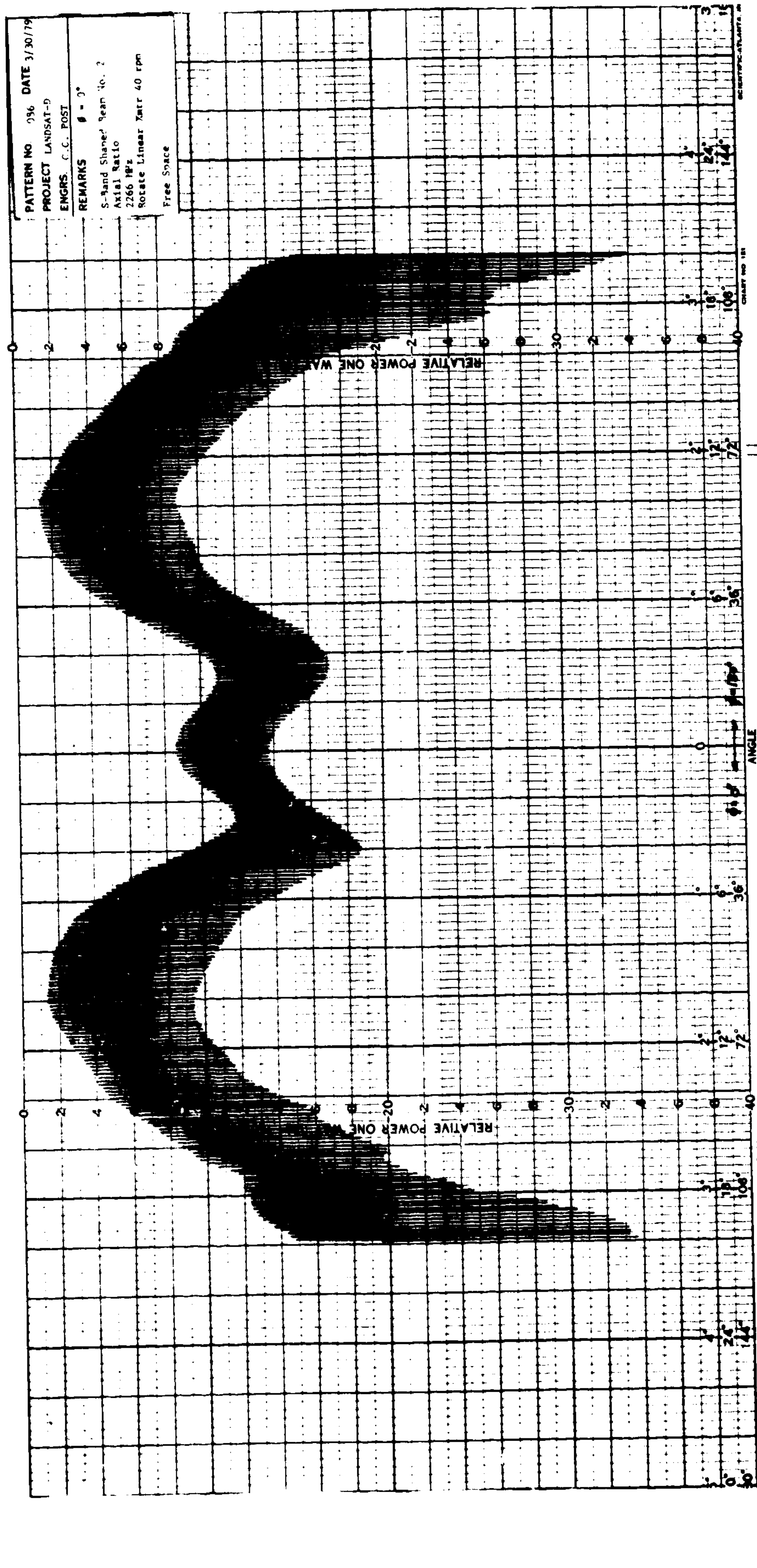

Fig. 114

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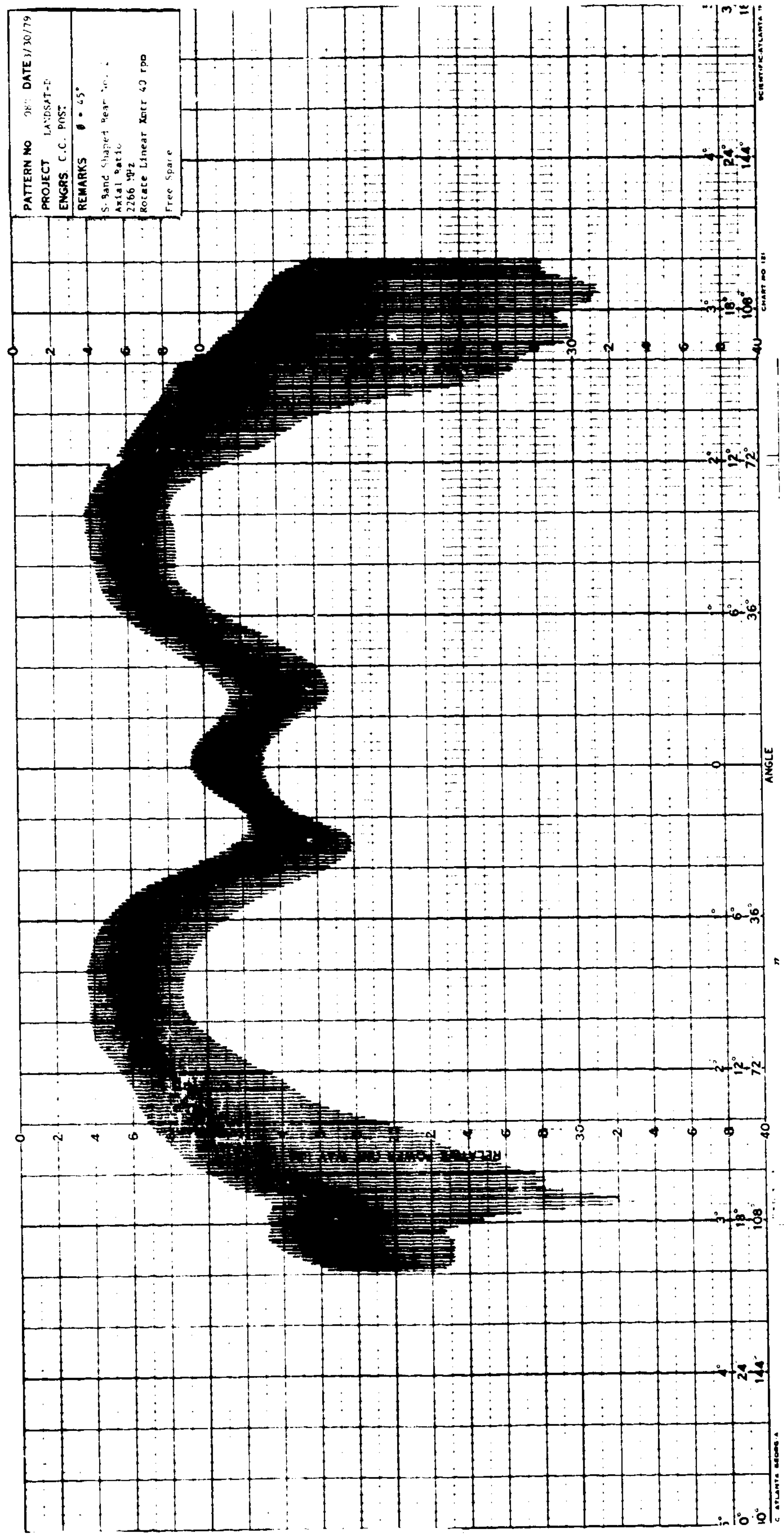

Fig. 115

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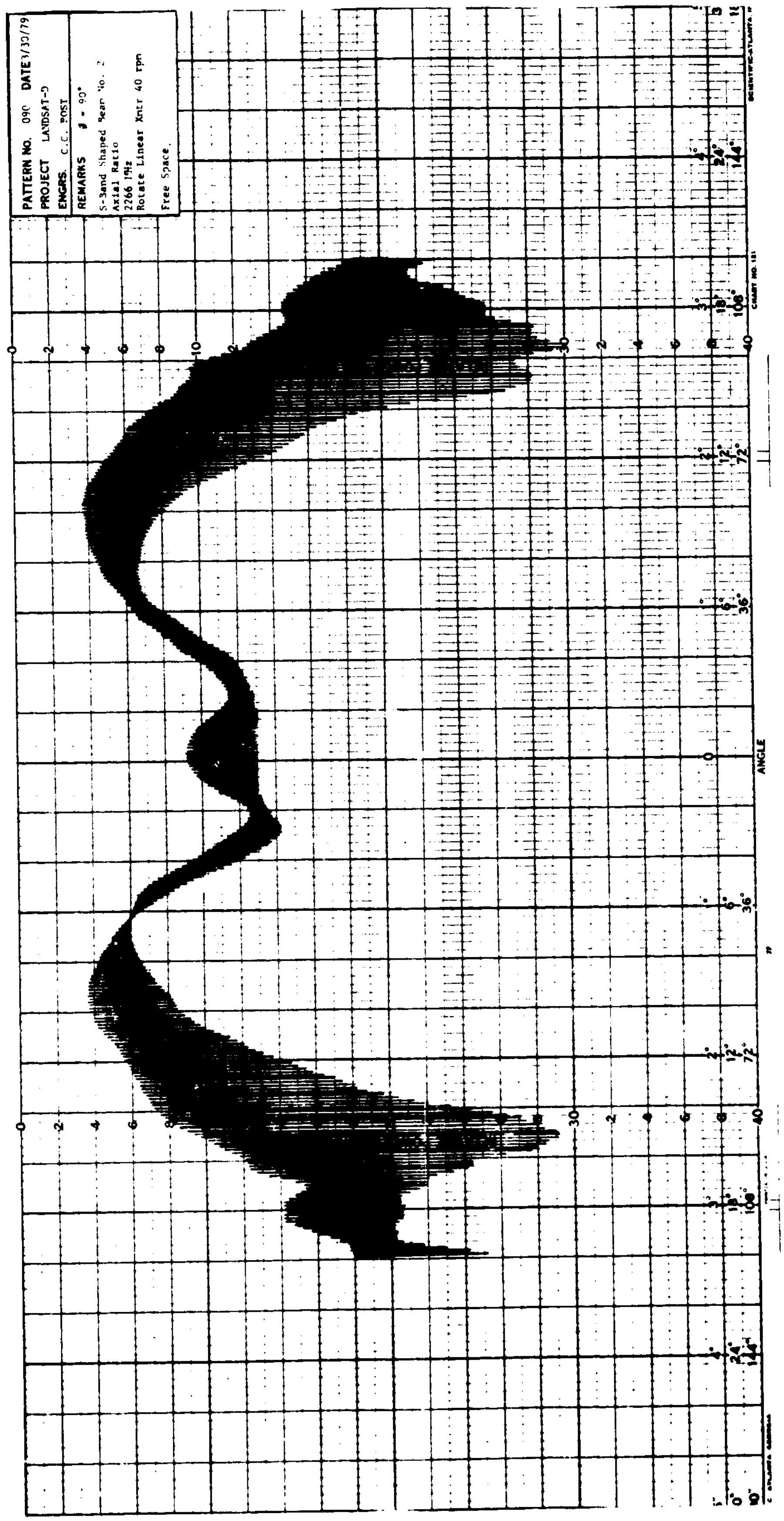

Fig. 116

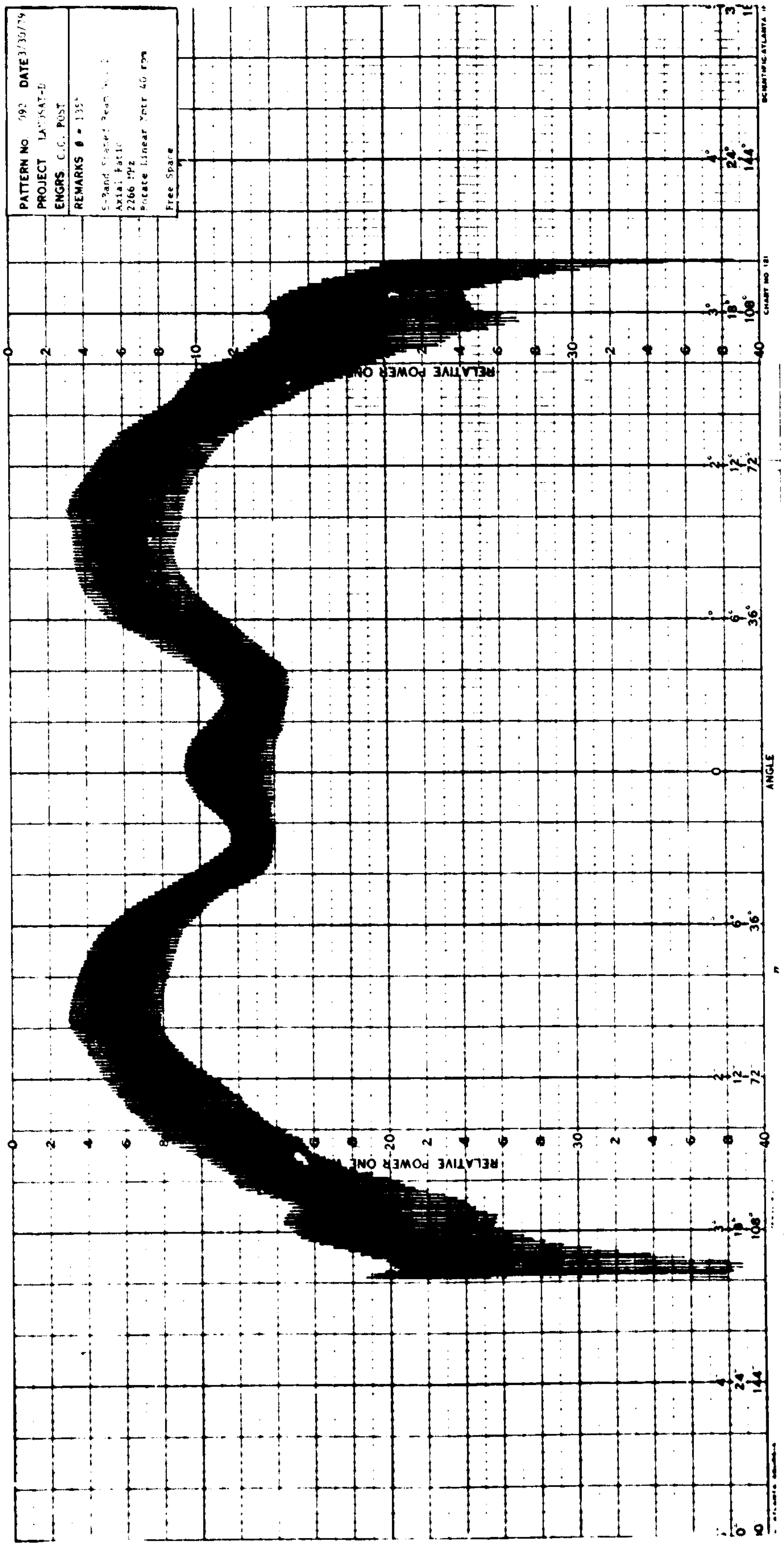

Fig. 117

11.9 GPS Antenna - 1228 MHz

11.9.1 Antenna Patterns - R.C. Polarization

Polarization Axial Ratio

Measured Gain - +5.3 dBi at $(\phi,\theta) = (0°,0°)$

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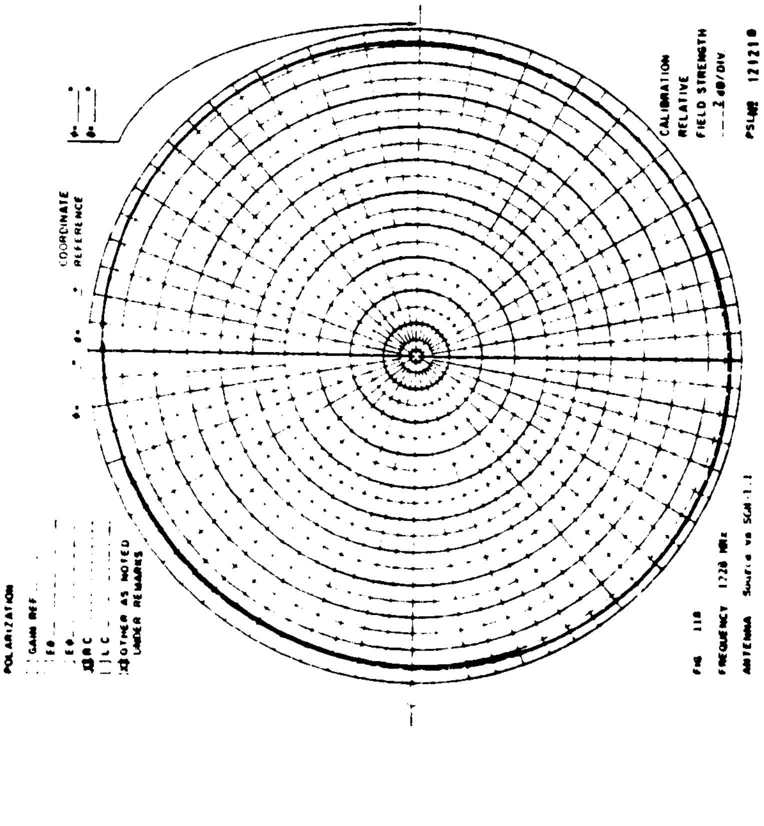


FIG 118
FREQUENCY 1228 MHz
ANTENNA Source vs SCH-1.1
REMARKS Source Circularity Check
Solid line - Rotating Source
Dashed Line - Rotating SCH 1.1

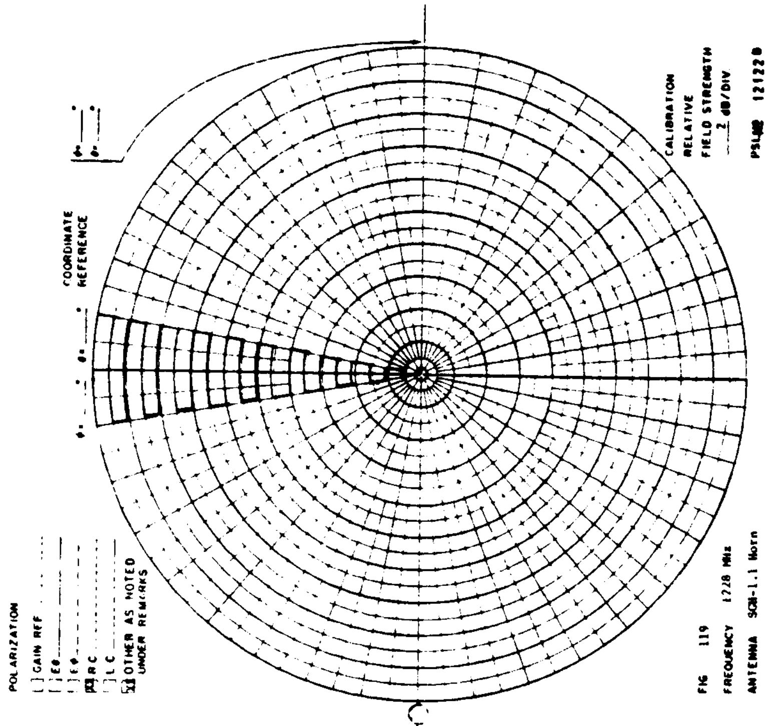
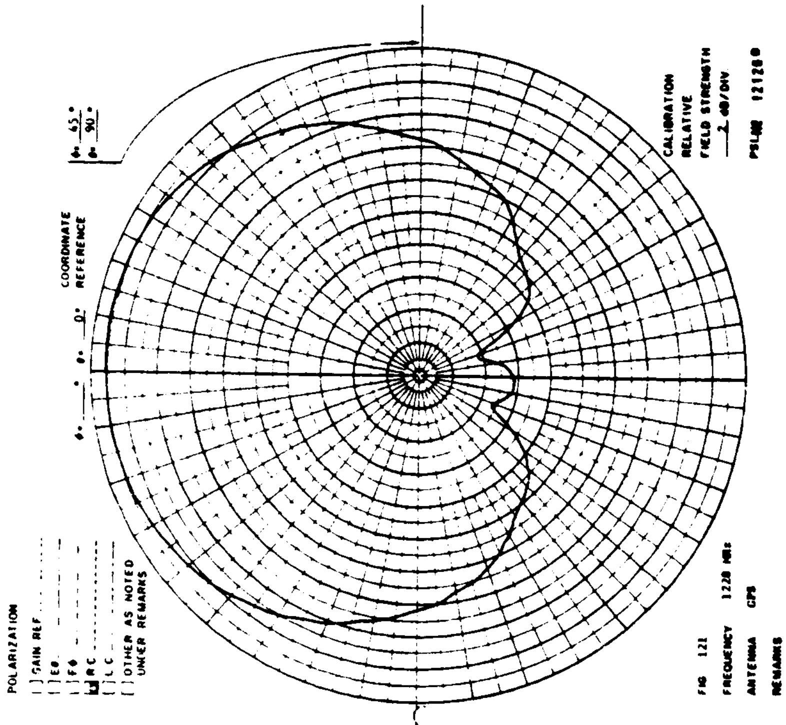
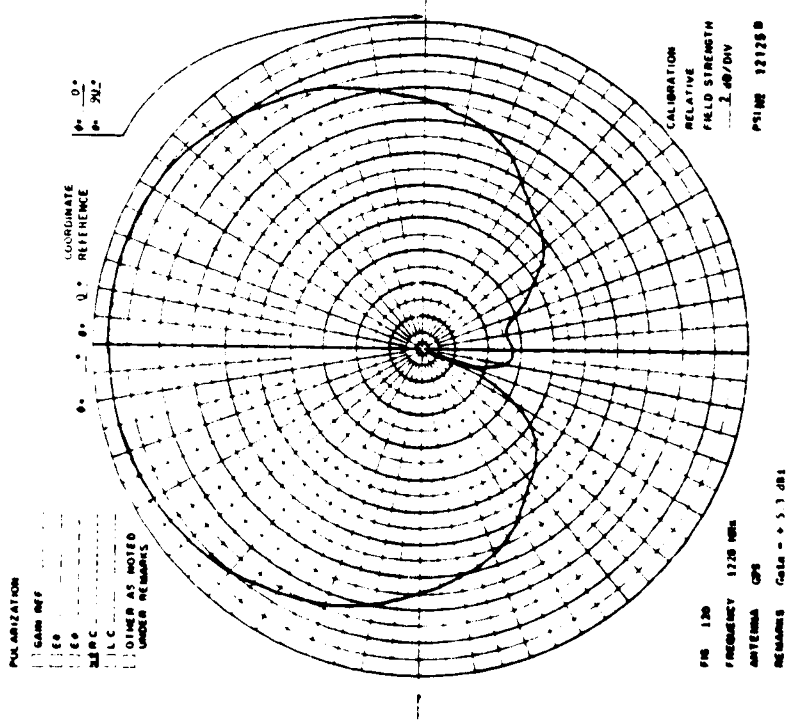
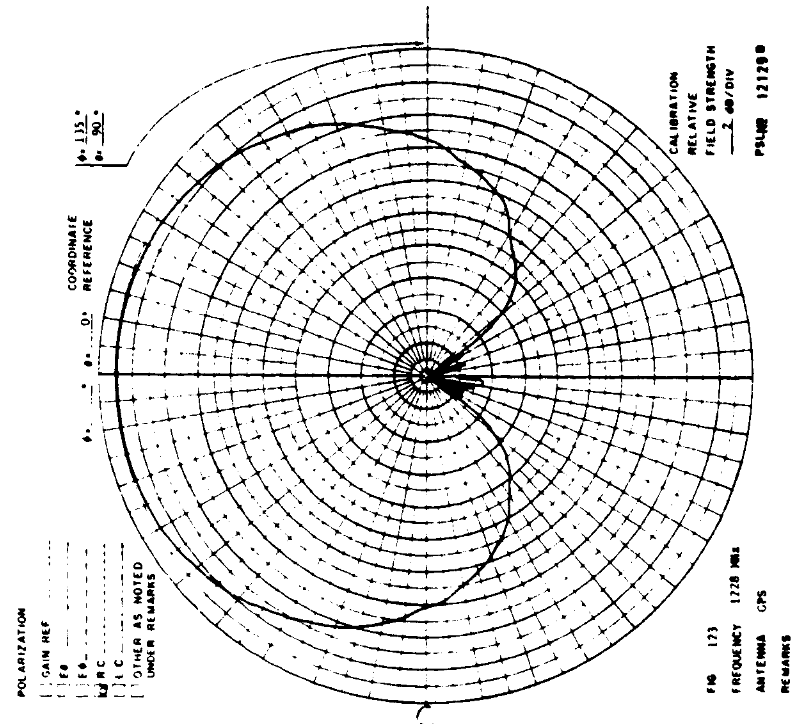
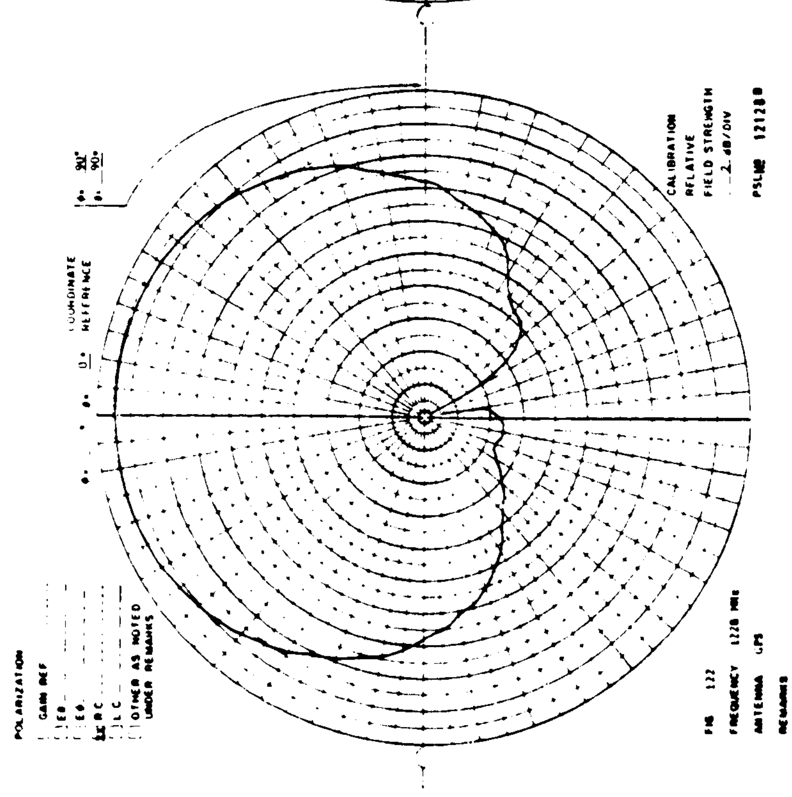


FIG 119
FREQUENCY 1228 MHz
ANTENNA SCH-1.1 Horn
REMARKS System Linearity Check


POLARIZATION
GAIN REF
Eθ
Eφ
RC
LC
OTHER AS NOTED UNDER REMARKS
COORDINATE REFERENCE
θ = 0°
φ = 45°
φ = 90°
CALIBRATION
RELATIVE FIELD STRENGTH
2 dB/DIV
PSI NO 12128 D
FIG 121
FREQUENCY 1228 MHz
ANTENNA GPS
REMARKS


POLARIZATION
GAIN REF
Eθ
Eφ
RC
LC
OTHER AS NOTED UNDER REMARKS
COORDINATE REFERENCE
θ = 0°
φ = 0°
φ = 90°
CALIBRATION
RELATIVE FIELD STRENGTH
2 dB/DIV
PSI NO 12128 D
FIG 120
FREQUENCY 1228 MHz
ANTENNA GPS
REMARKS Gain = + 5.1 dBi


POLARIZATION
GAIN REF
RC
LC
OTHER AS NOTED UNDER REMARKS
COORDINATE REFERENCE
CALIBRATION
RELATIVE FIELD STRENGTH
2 dB/DIV
FIG 123
FREQUENCY 1228 MHz
ANTENNA GPS
REMARKS


POLARIZATION
GAIN REF
RC
LC
OTHER AS NOTED UNDER REMARKS
COORDINATE REFERENCE
CALIBRATION
RELATIVE FIELD STRENGTH
2 dB/DIV
FIG 122
FREQUENCY 1228 MHz
ANTENNA GPS
REMARKS

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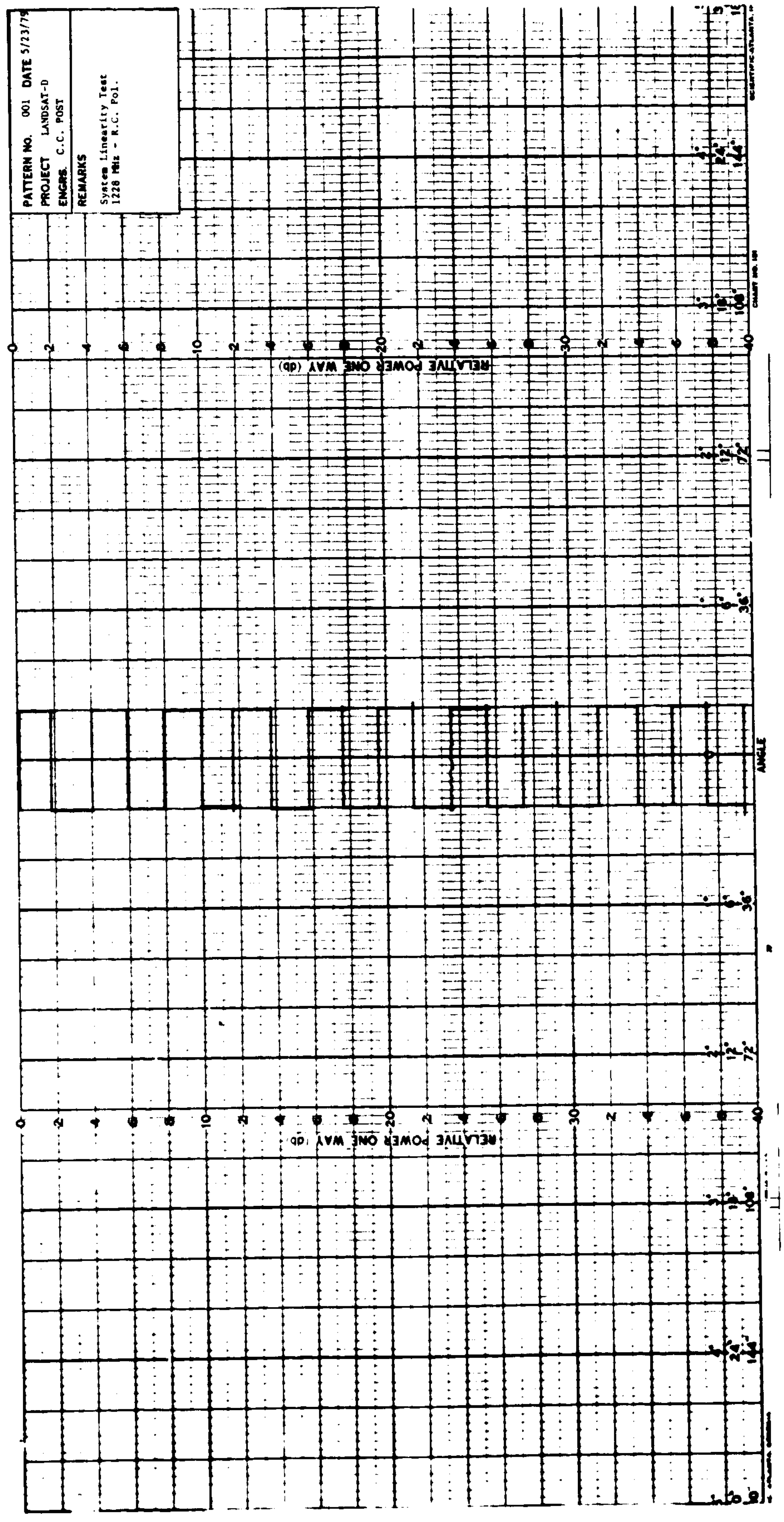

Fig. 124

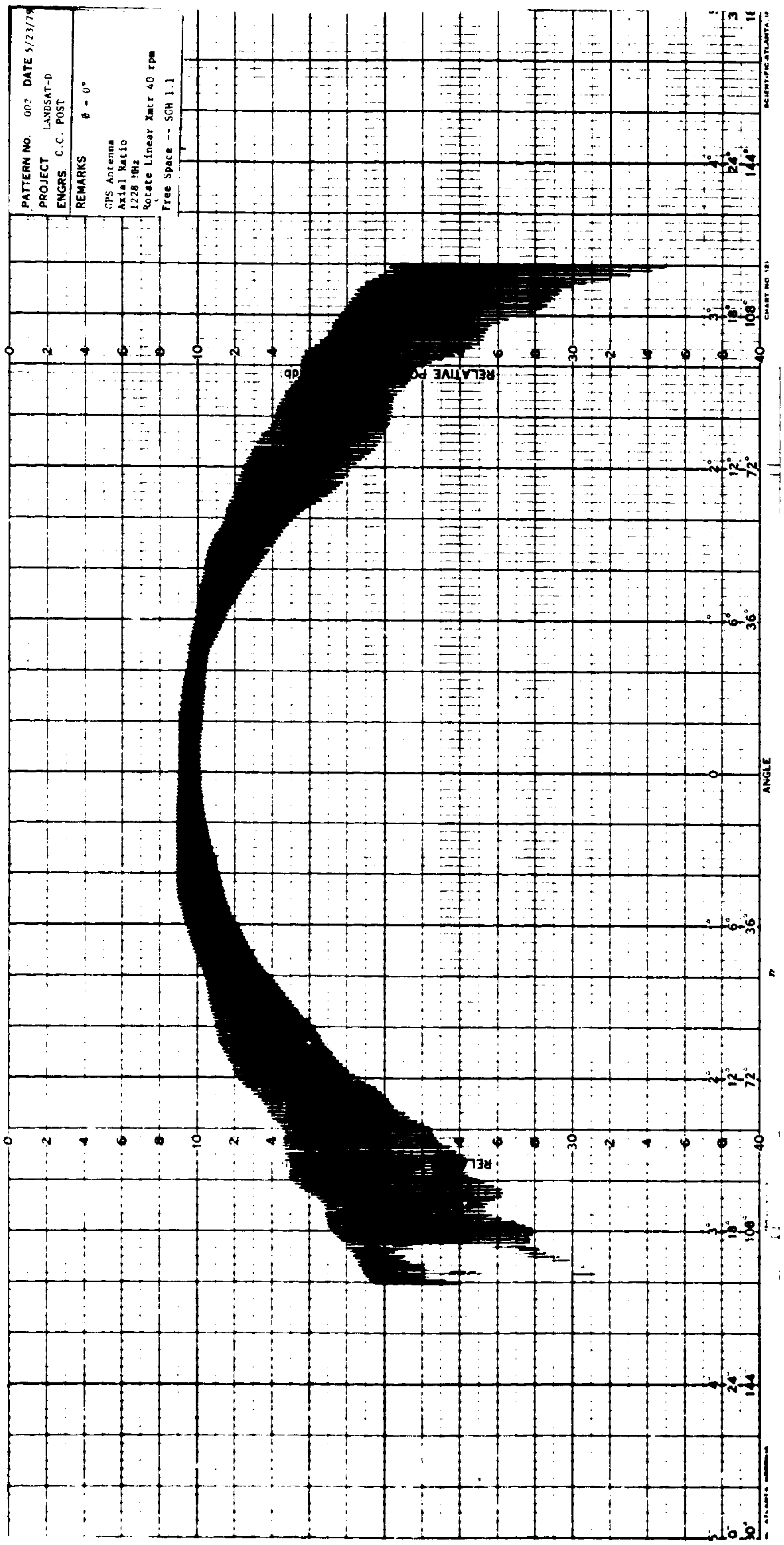
PATTERN No. 002 DATE 5/23/79
PROJECT LANDSAT-D
ENGRS. C.C. POST
REMARKS ø = 0°
GPS Antenna
Axial Ratio
1228 MHz
Rotate Linear Xmtr 40 rpm
Free Space -- SGH 1.1
RELATIVE POWER (db)
ANGLE

Fig. 125

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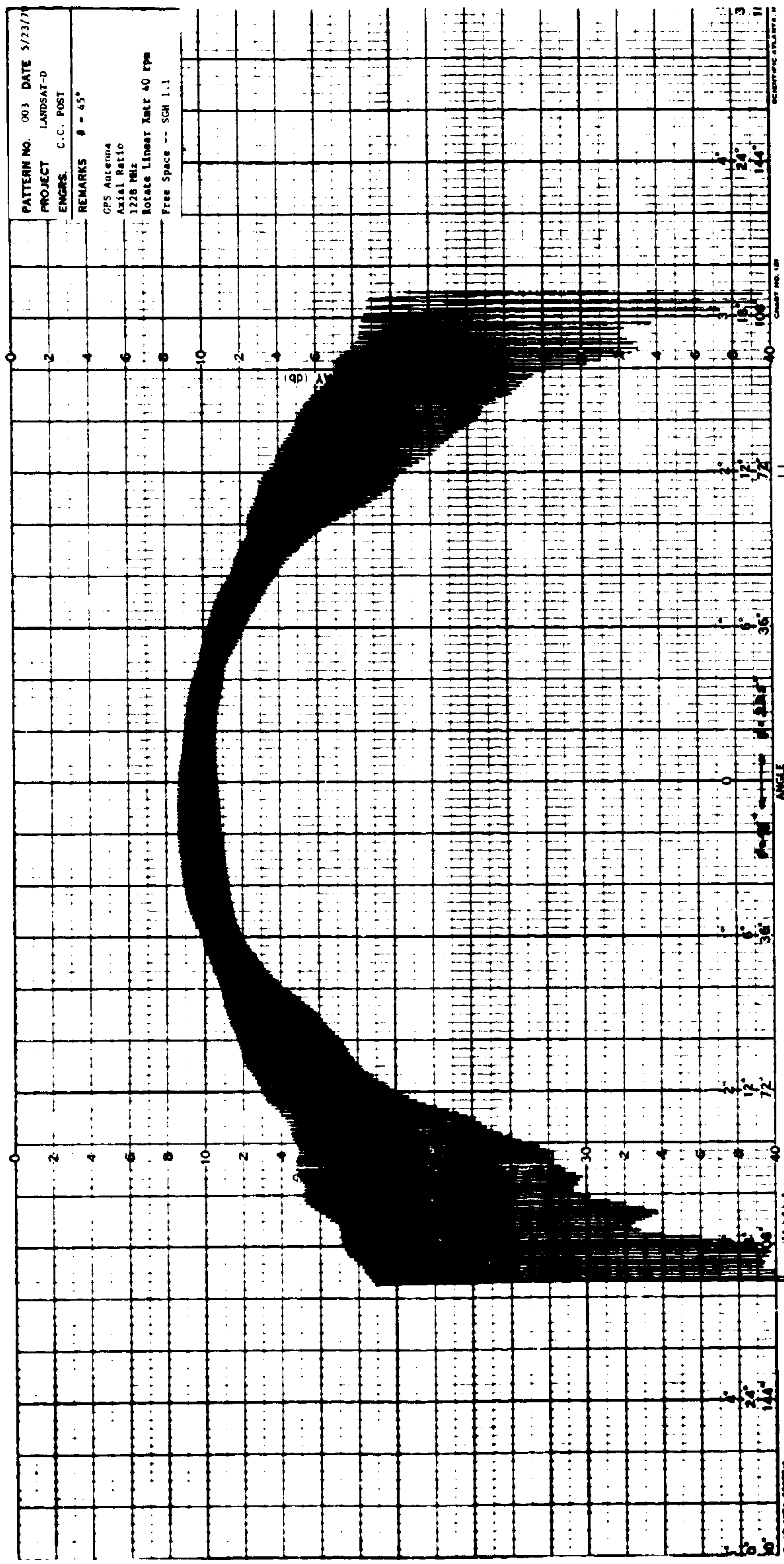

Fig. 126

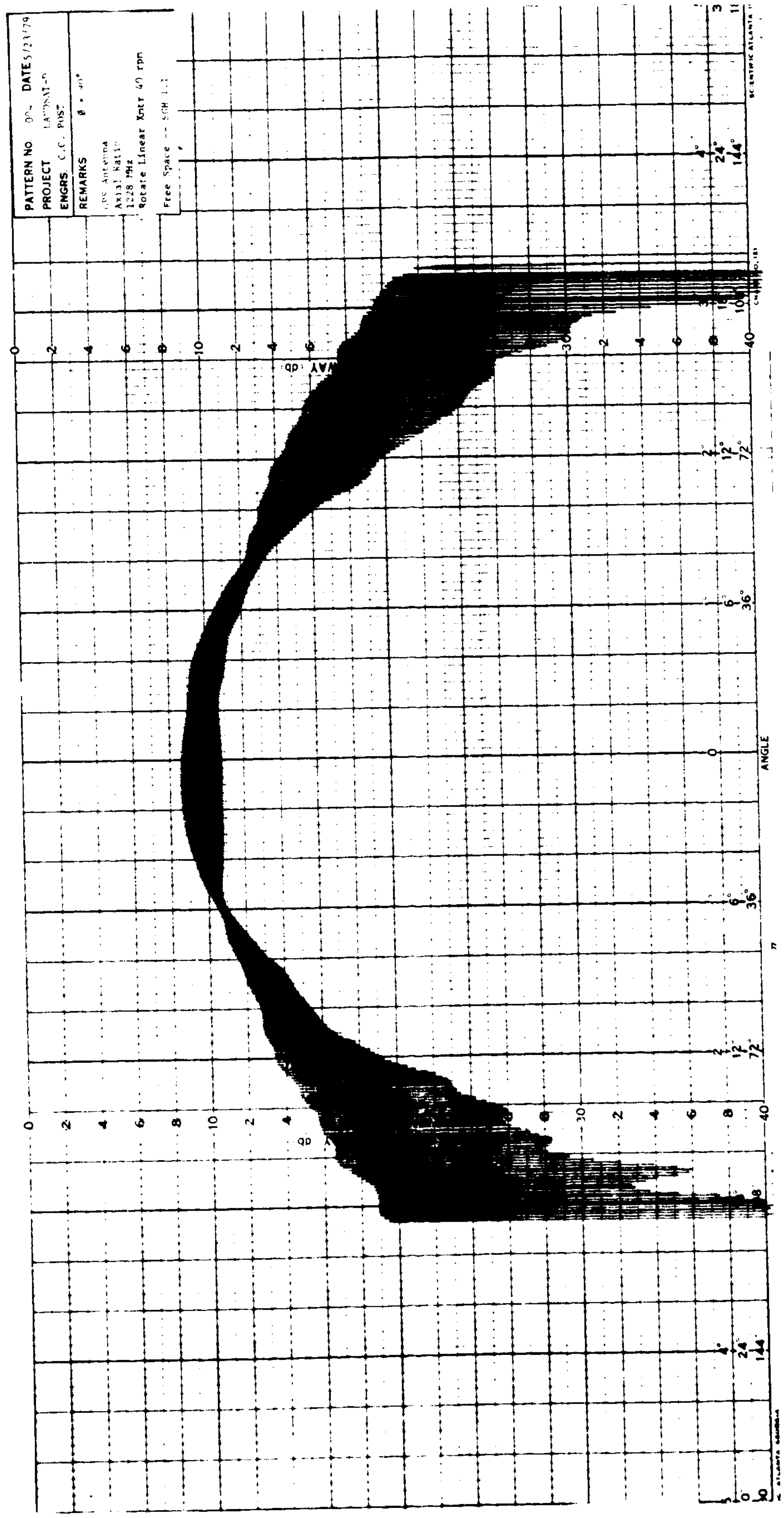

Fig. 127

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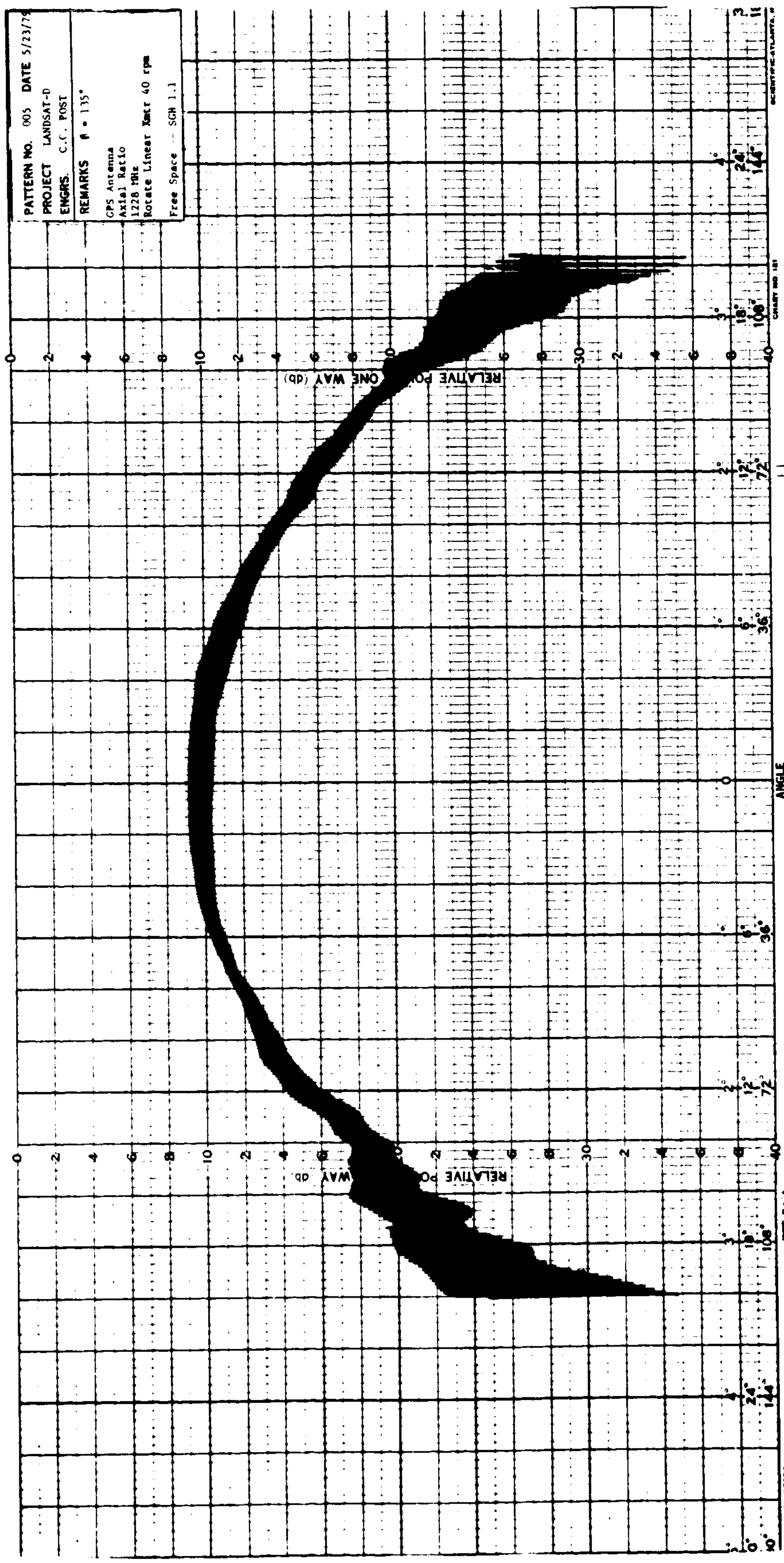


Fig. 128

11.10 GPS Antenna - 1575 MHz

11.10.1 Antenna Patterns - R.C. Polarization

Gain - +1.7 dBi at $(\phi,\theta) = (0°,0°)$

Polarization Axial Ratio

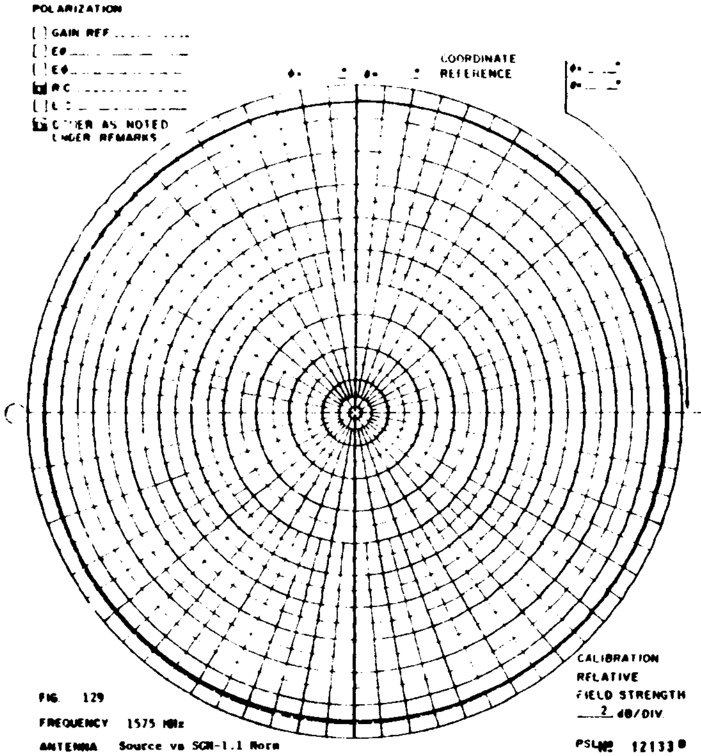


FIG. 129
FREQUENCY 1575 MHz
ANTENNA Source vs SGH-1.1 Horn
REMARKS Source Circularity Check
Solid Line - Rotating Source
Dashed Line - Rotating SGH-1.1

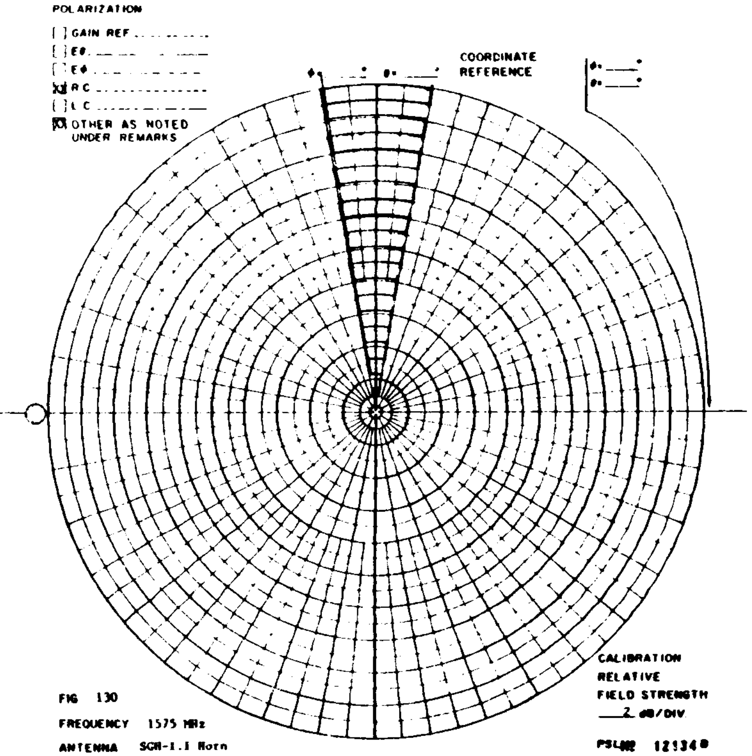
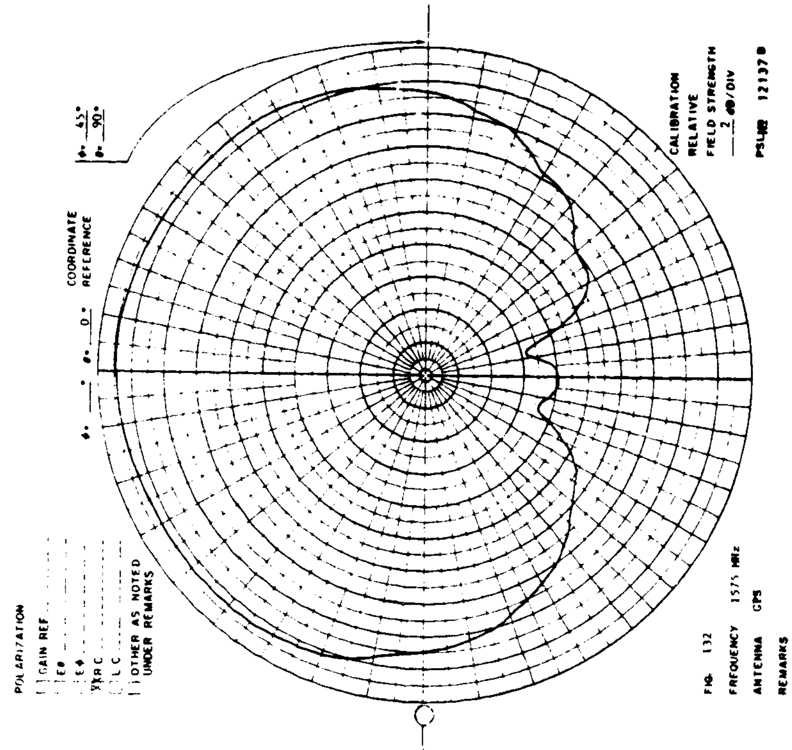
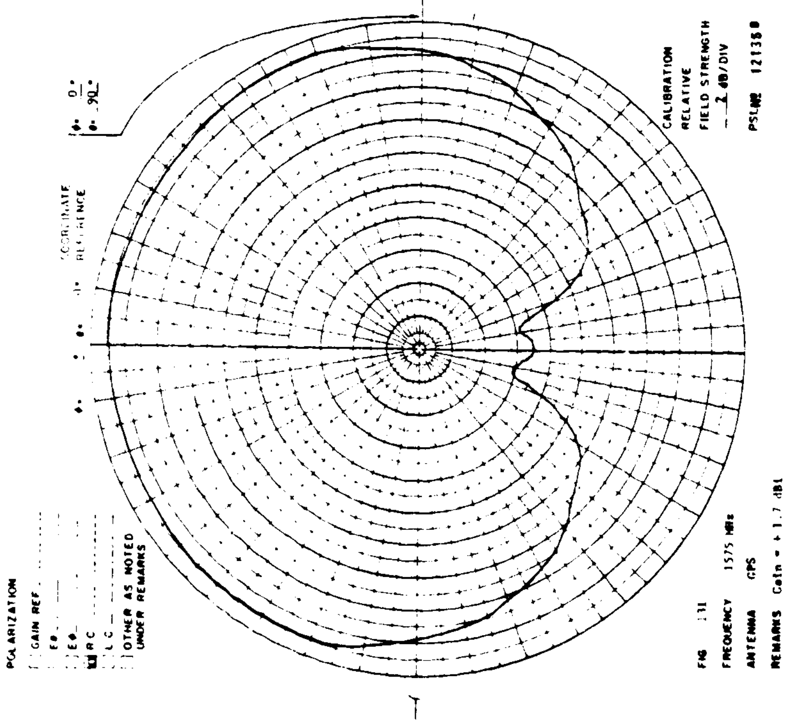


FIG. 130
FREQUENCY 1575 MHz
ANTENNA SGH-1.1 Horn
REMARKS Linearity Check


POLARIZATION
GAIN REF.
E_θ
E_ϕ
RC
LC
OTHER AS NOTED UNDER REMARKS
COORDINATE REFERENCE
ϕ = 45°
θ = 90°
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
FIG. 132
FREQUENCY 1575 MHz
ANTENNA GPS
REMARKS


POLARIZATION
GAIN REF.
E_θ
E_ϕ
RC
LC
OTHER AS NOTED UNDER REMARKS
COORDINATE REFERENCE
ϕ = 0°
θ = 90°
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
FIG. 131
FREQUENCY 1575 MHz
ANTENNA GPS
REMARKS Gain = +1.7 dBi

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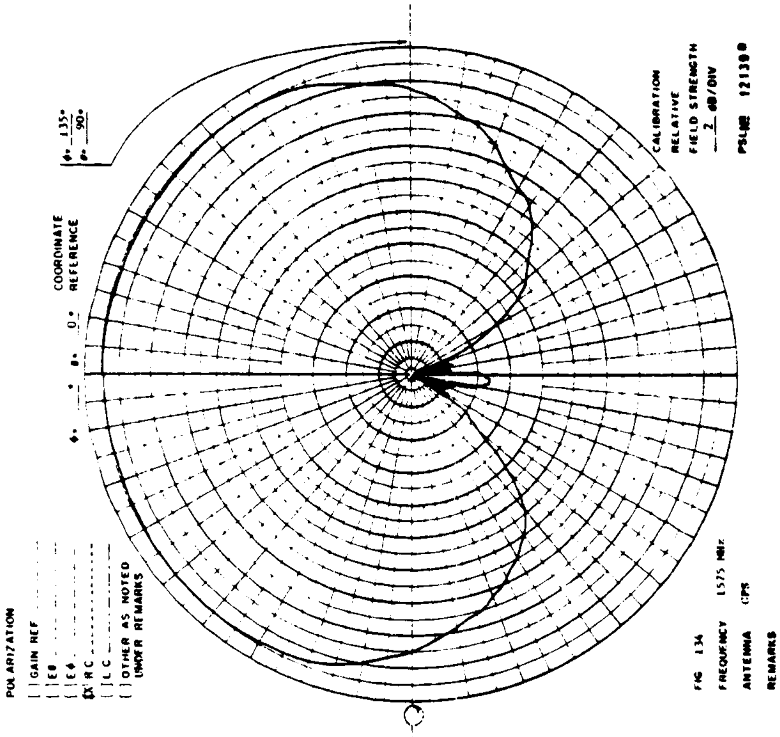

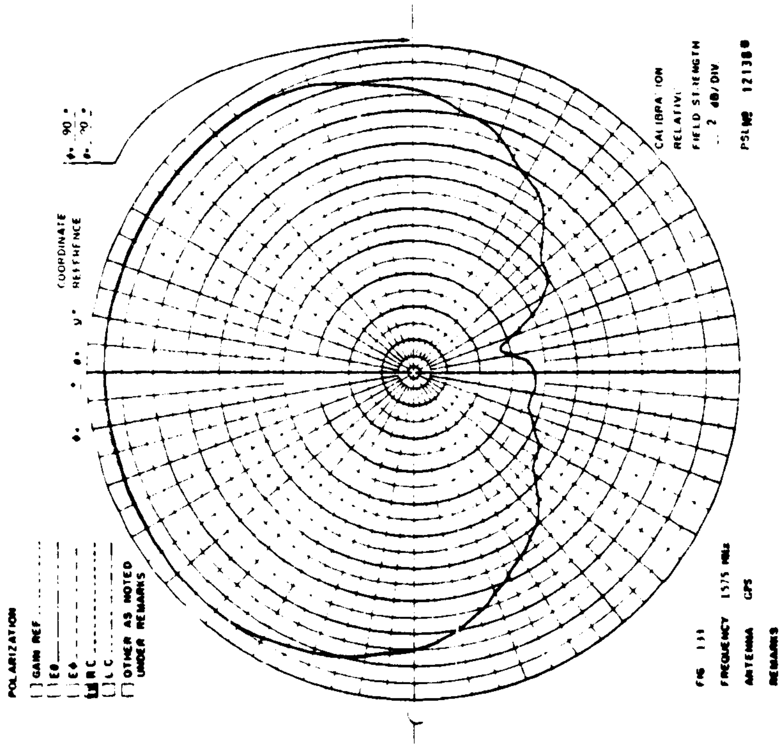

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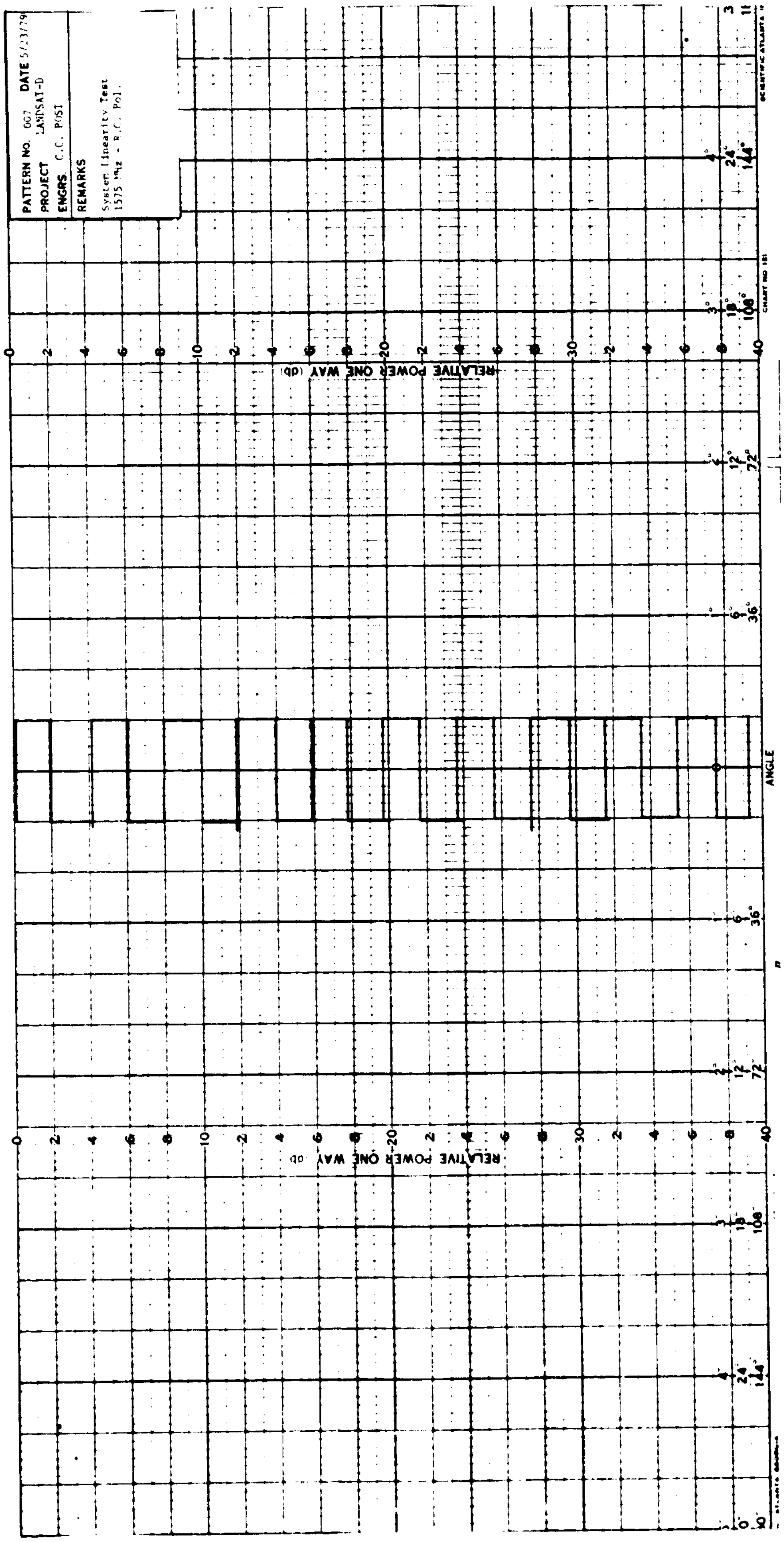

Fig. 135

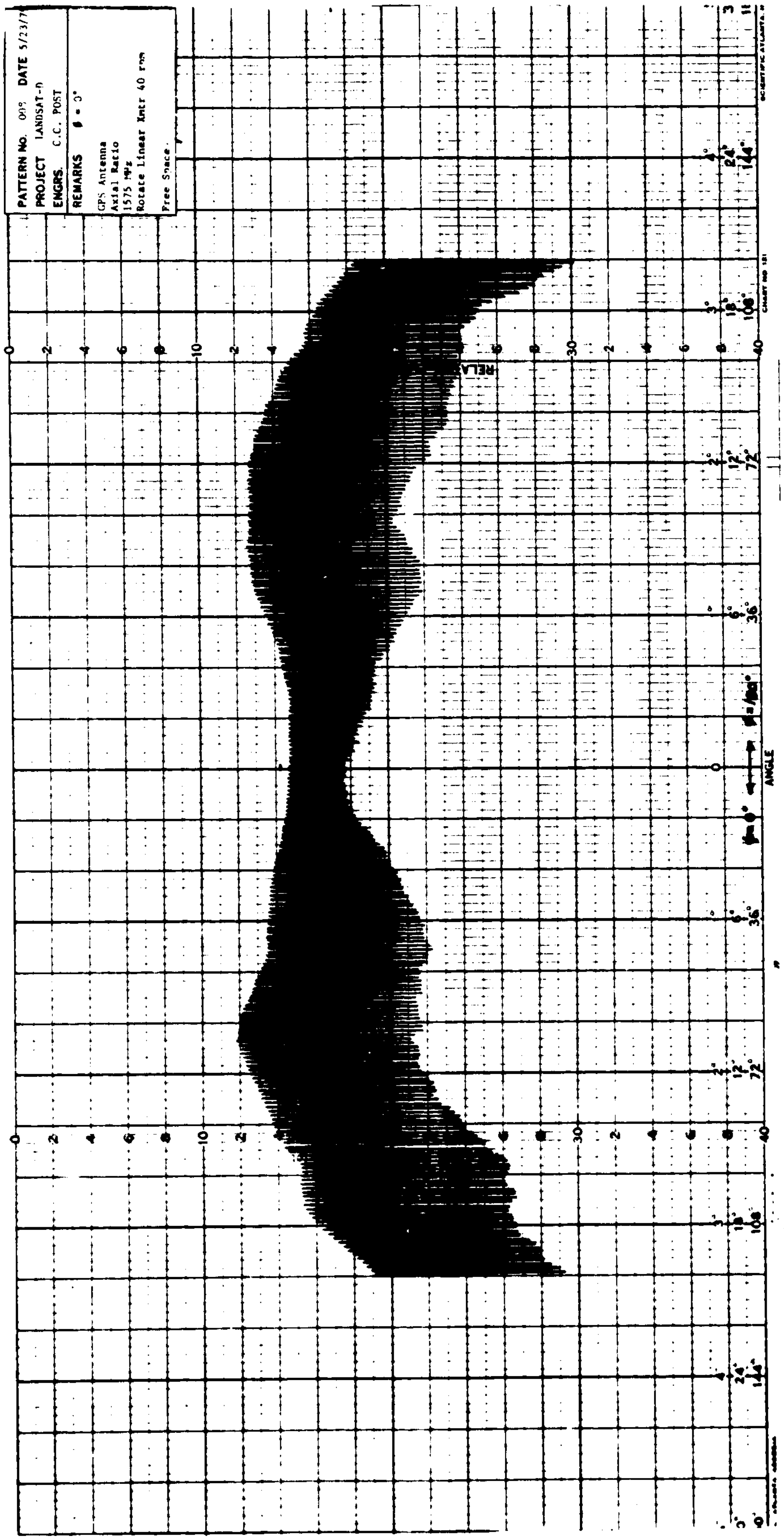
PATTERN NO. 009 DATE 5/23/7
PROJECT LANDSAT-D
ENGRS. C.C. POST
REMARKS
GPS Antenna
Axial Ratio
1575 MHz
Rotate Linear Xmtr 40 rpm
Free Space
ANGLE

Fig. 136

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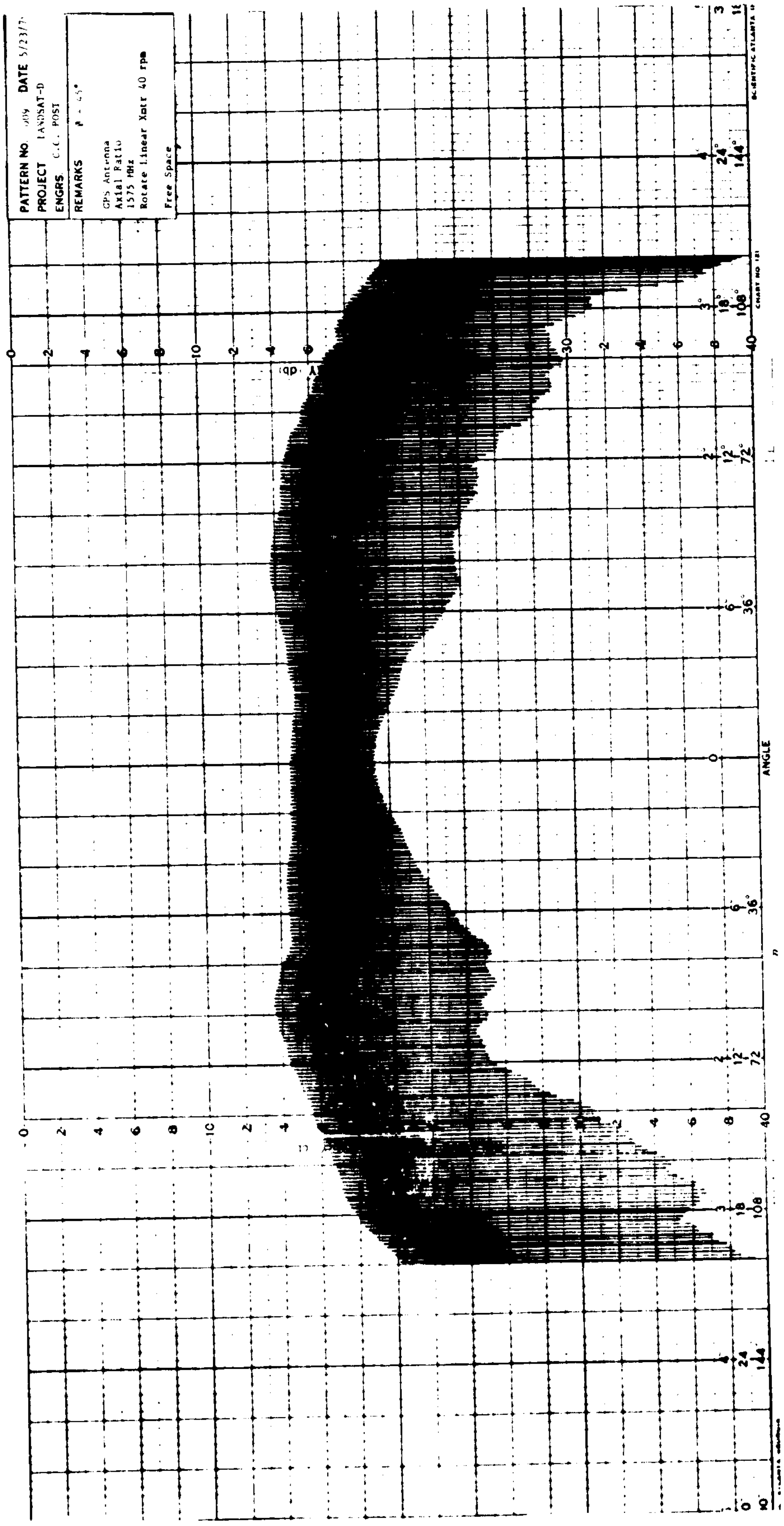

Fig. 137

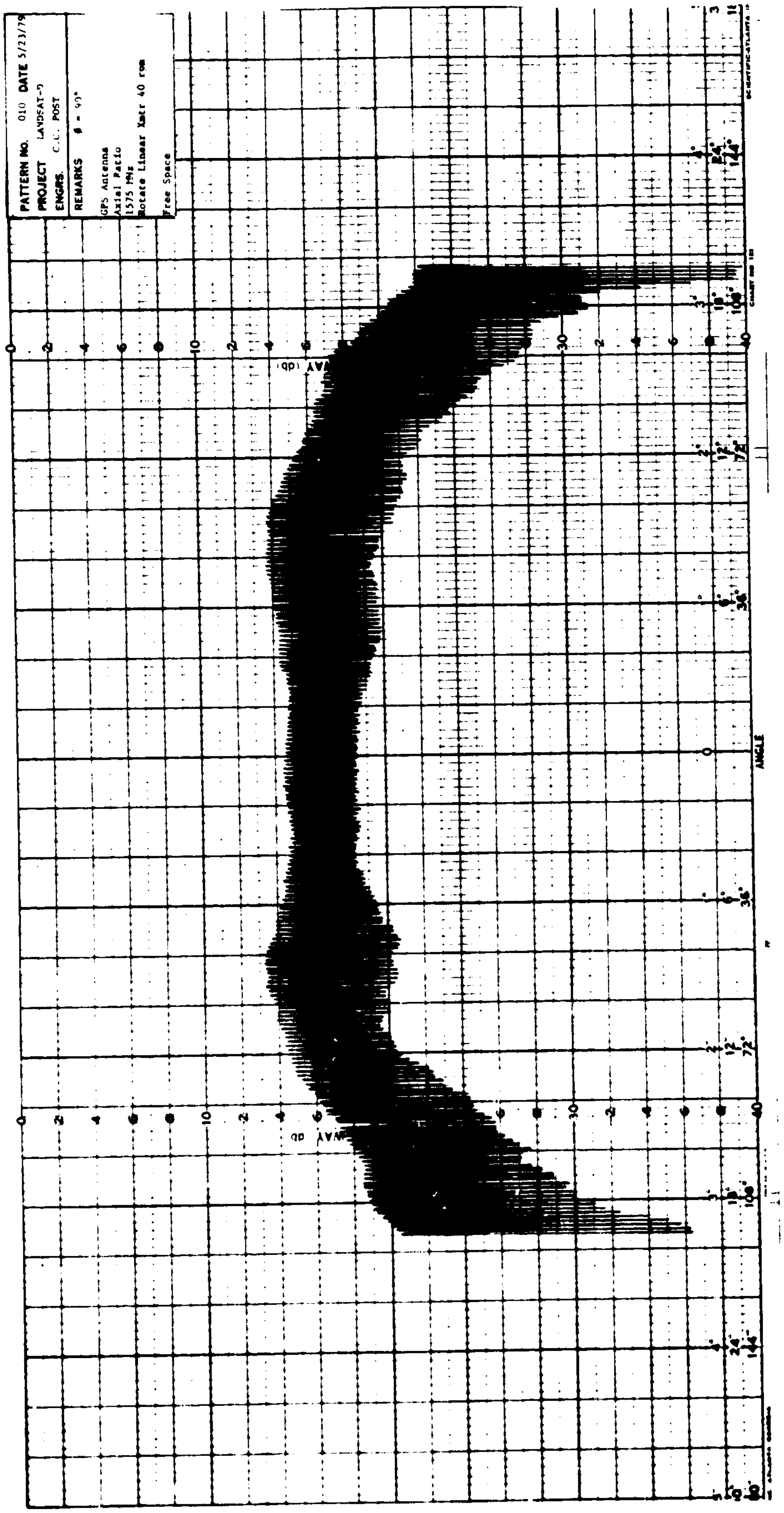
PATTERN NO. 010 DATE 5/23/79
PROJECT LANDSAT-D
ENGRS. C.C. POST
REMARKS φ = 90°
GPS Antenna
Axial Ratio
1575 MHz
Free Space
ANGLE

Fig. 138

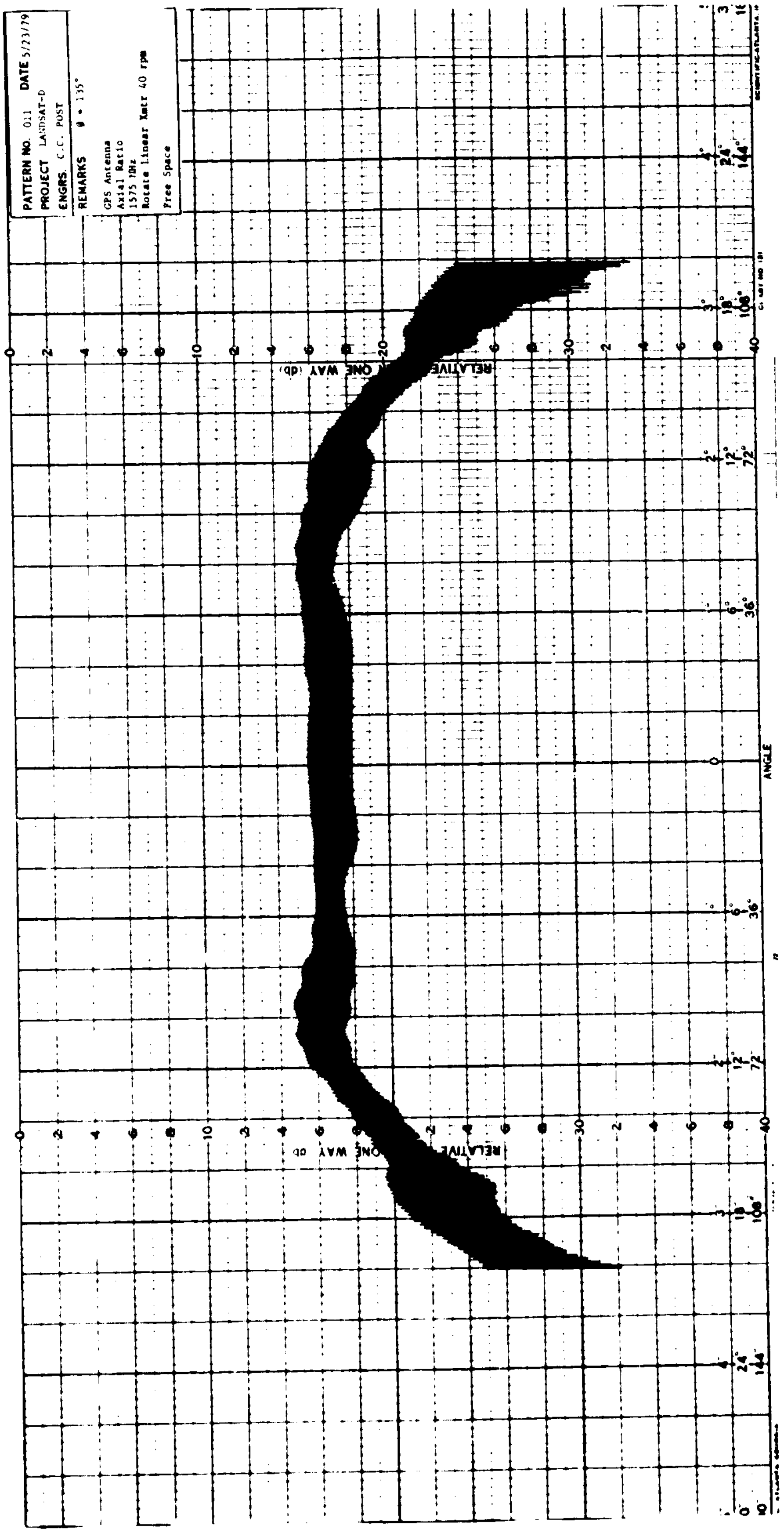
PATTERN NO. 011 DATE 5/23/79
PROJECT LANDSAT-D
ENGRS. C.C. POST
REMARKS φ = 135°
GPS Antenna
Axial Ratio
1575 MHz
Rotate Linear Xmtr 40 rpm
Free Space
RELATIVE ONE WAY (db)
ANGLE

Fig. 139

11.11 X-Band Shaped Beam Antenna - 8212.5 MHz

11.11.1 Antenna Patterns - R.C. Polarization

Measured Gain = +8.3 dBi at $(\phi,\theta) = (0°,64°)$

Polarization Axial Ratio

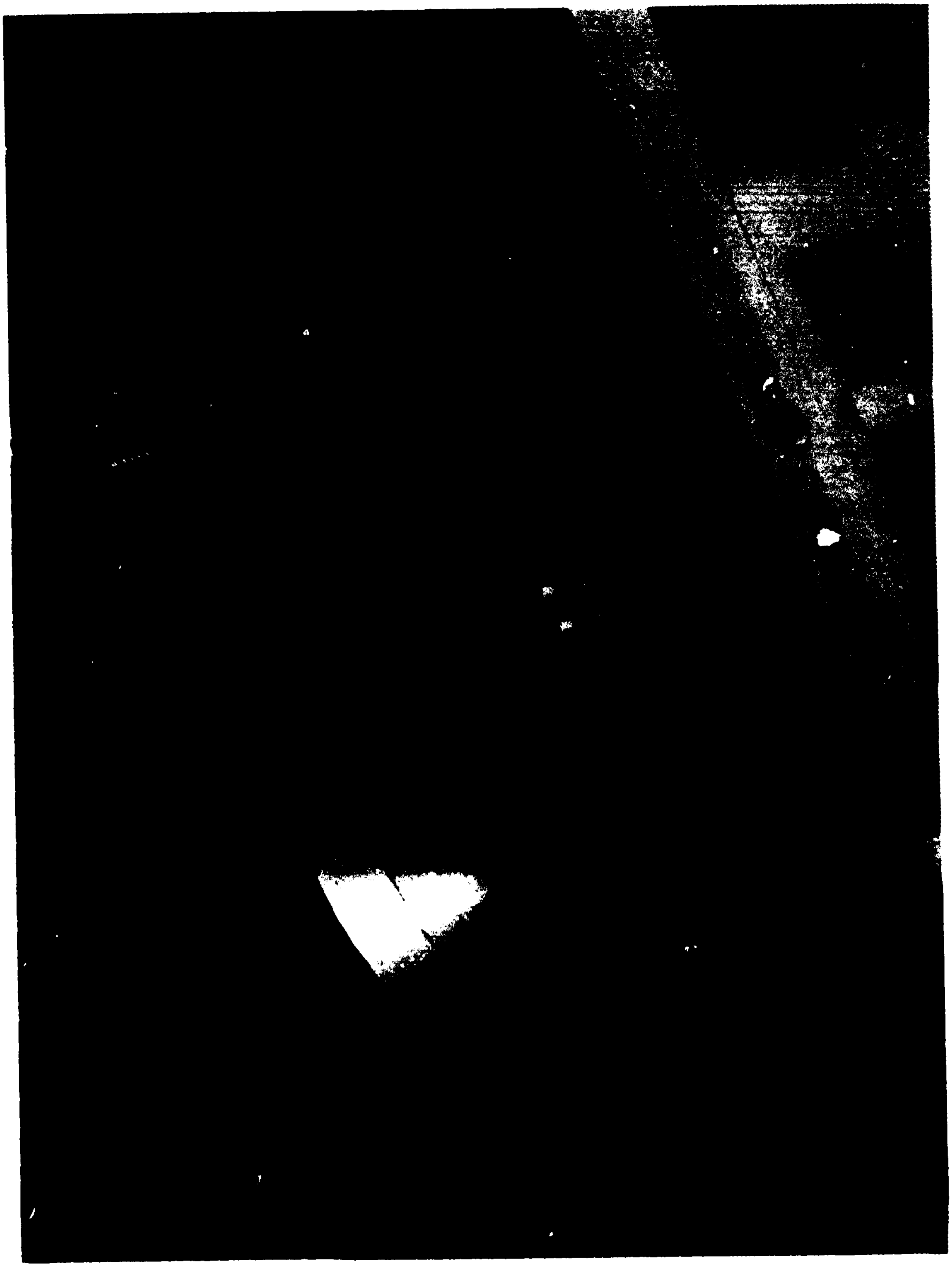

Fig. 140 - Waveguide Input to X-Band Shaped Beam Antenna No. 2

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Fig. 141 - Back View of the X-Band Shaped Beam Antenna No. 2

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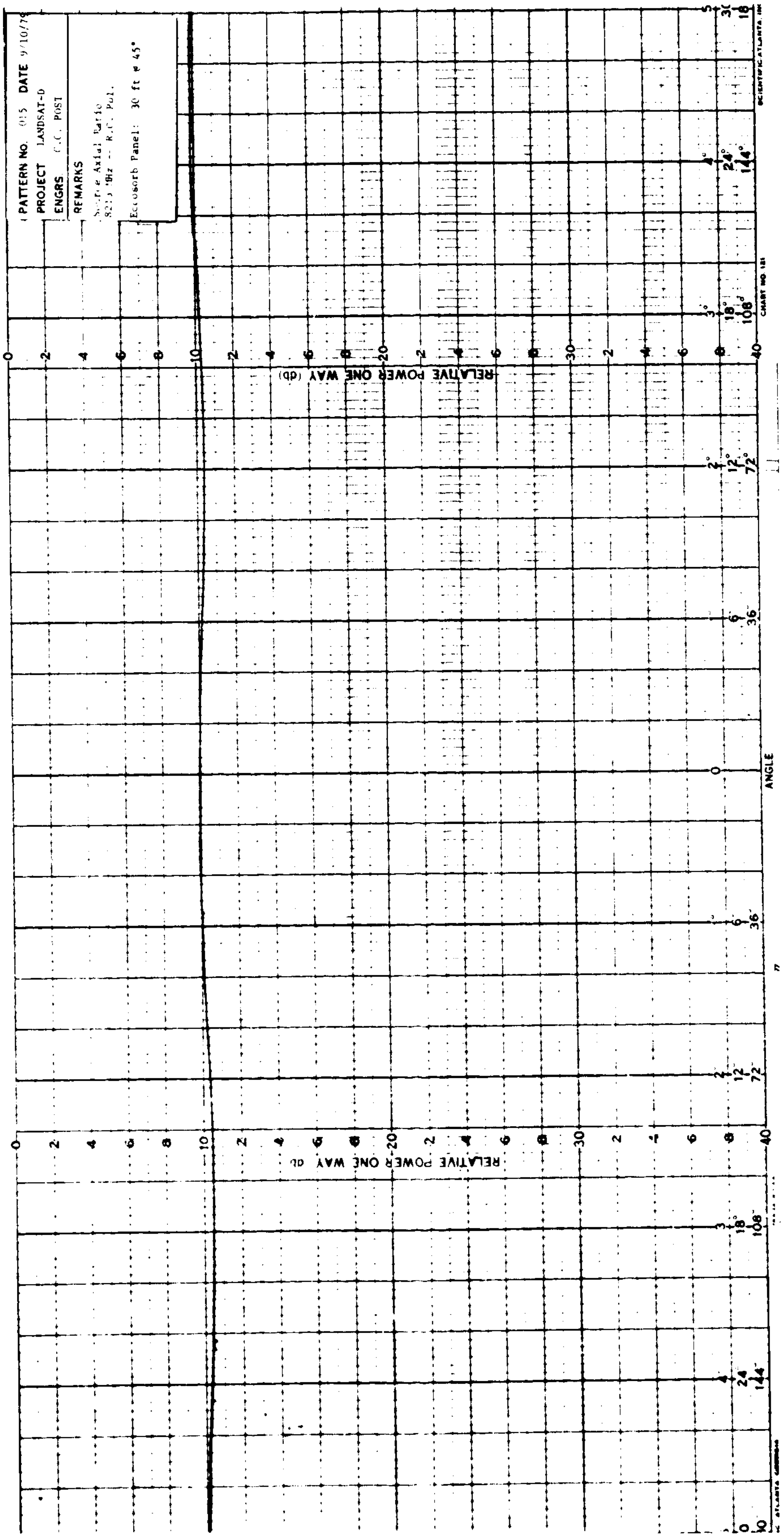

Fig. 142

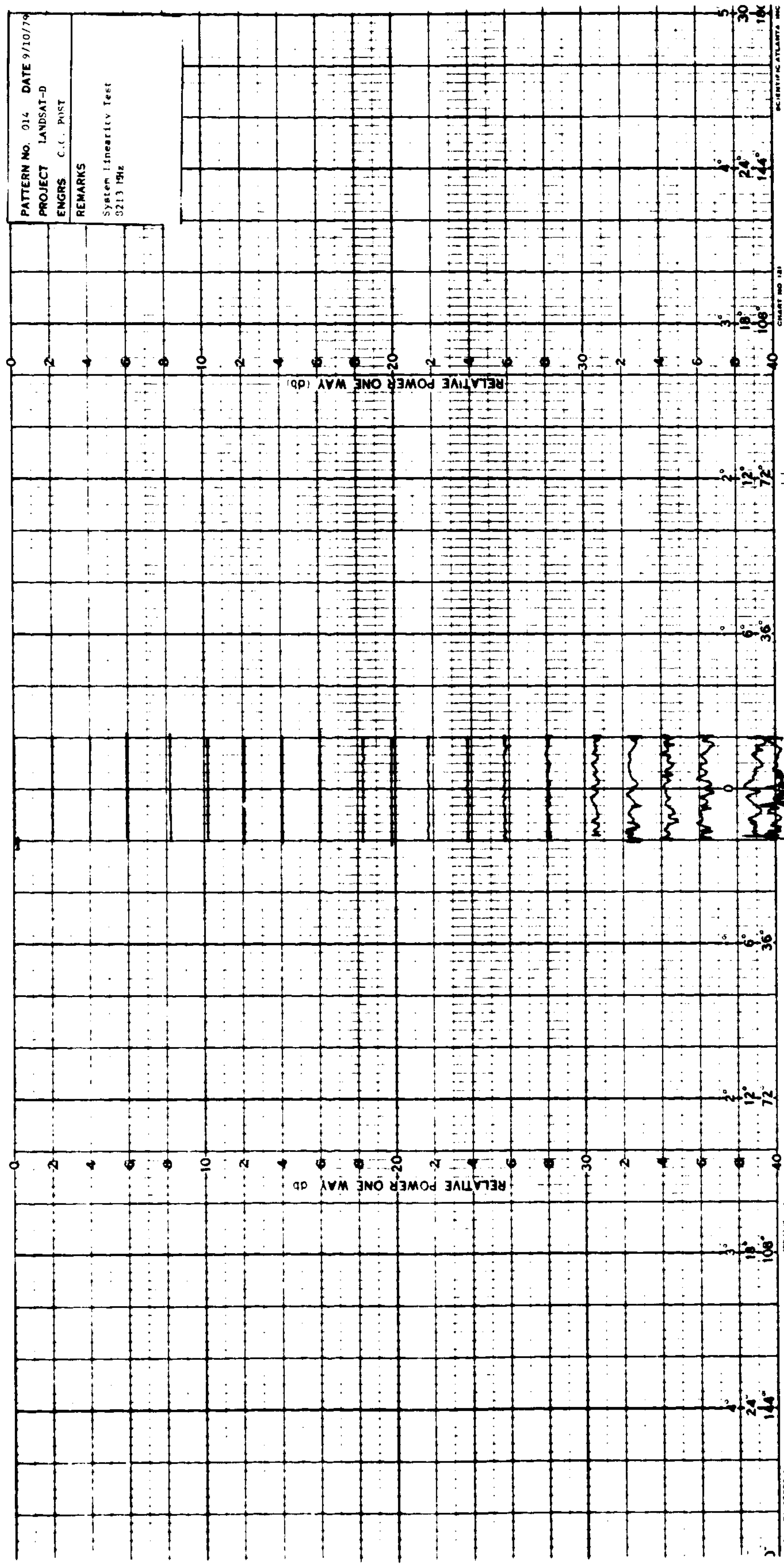

Fig. 143

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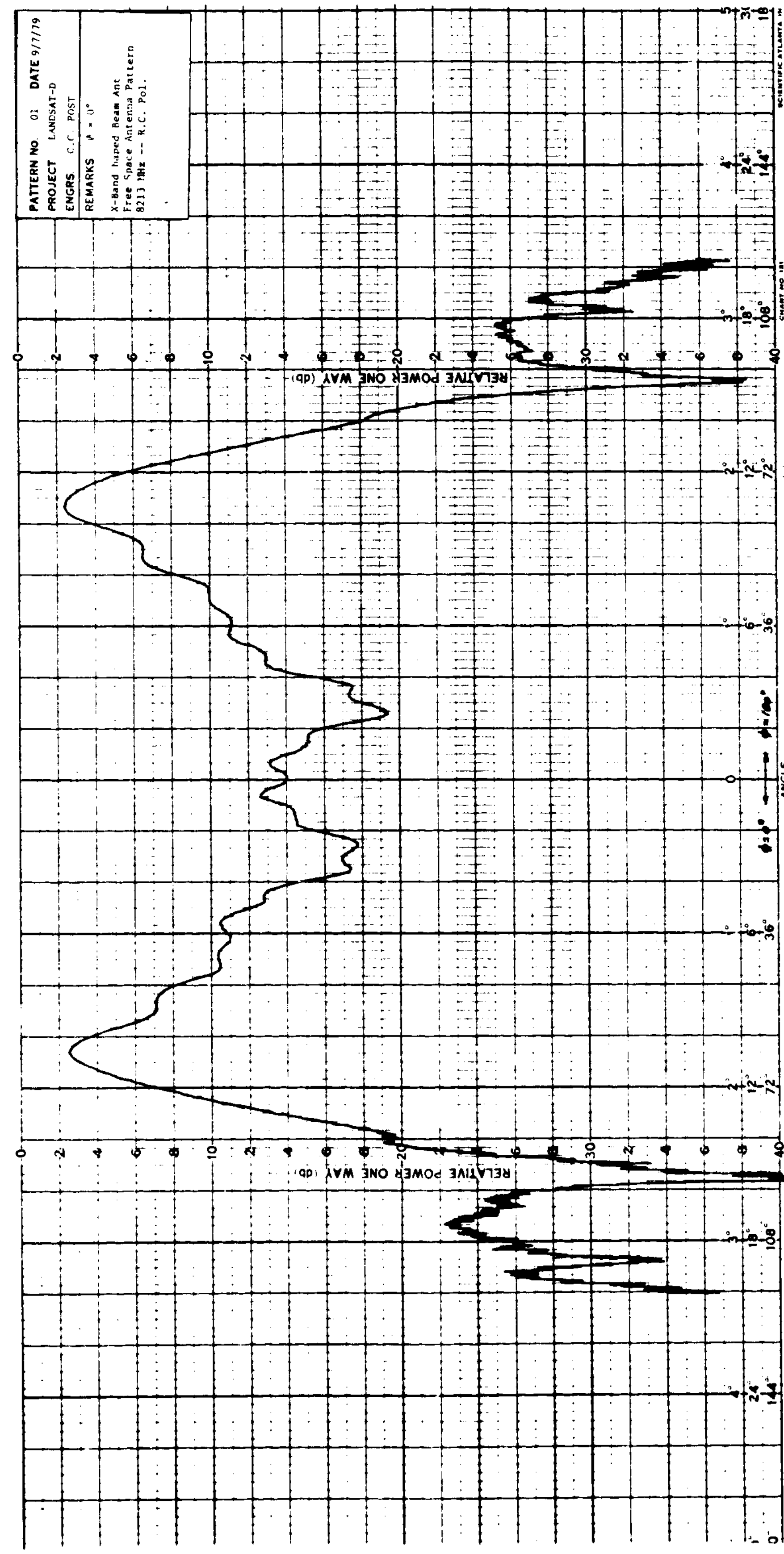

Fig. 144

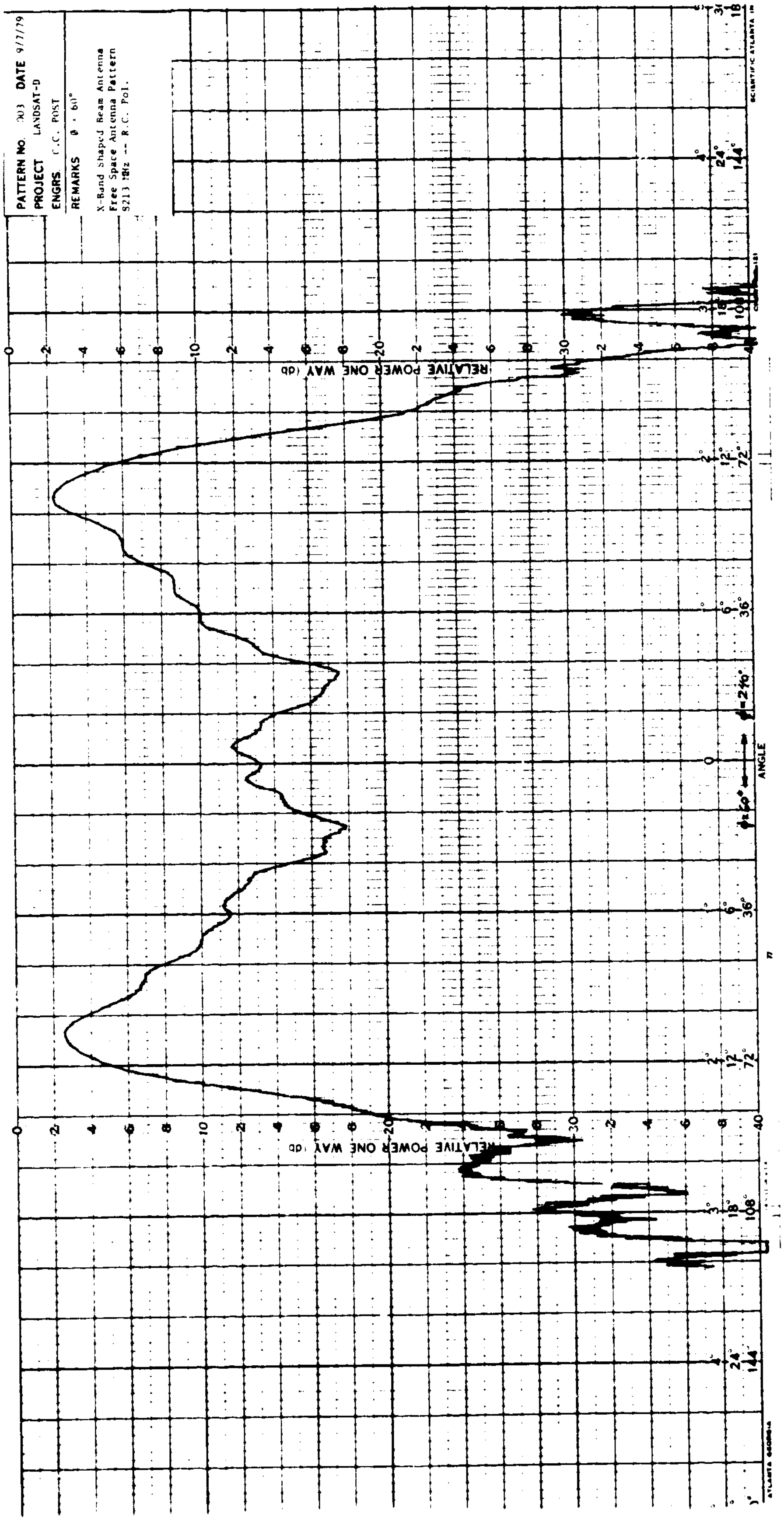
PATTERN NO.
DATE
PROJECT LANDSAT-D
ENGRS
REMARKS
X-Band Shaped Beam Antenna
Free Space Antenna Pattern
R.C. Pol.
RELATIVE POWER ONE WAY (db)
ANGLE

Fig. 145

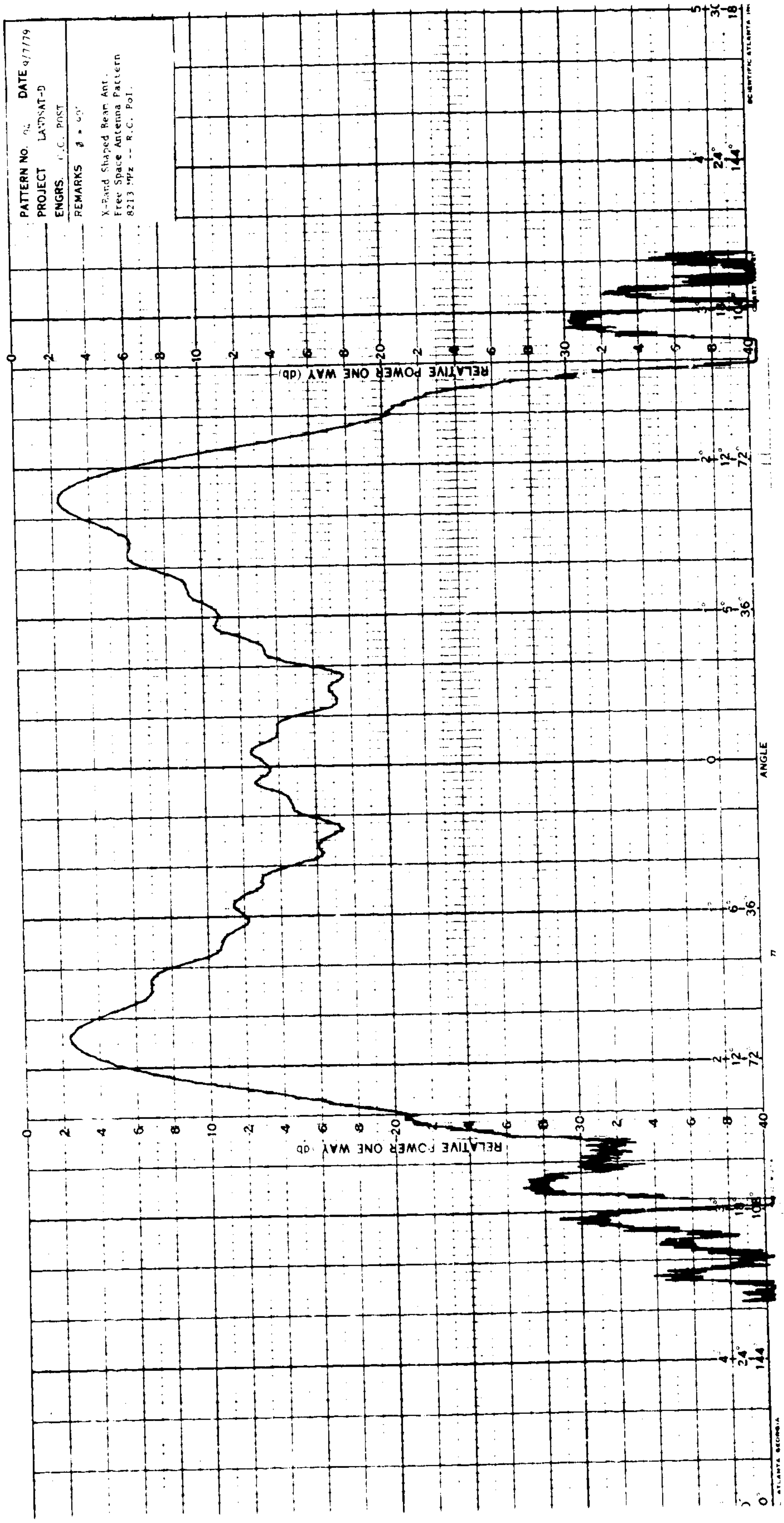

Fig. 146

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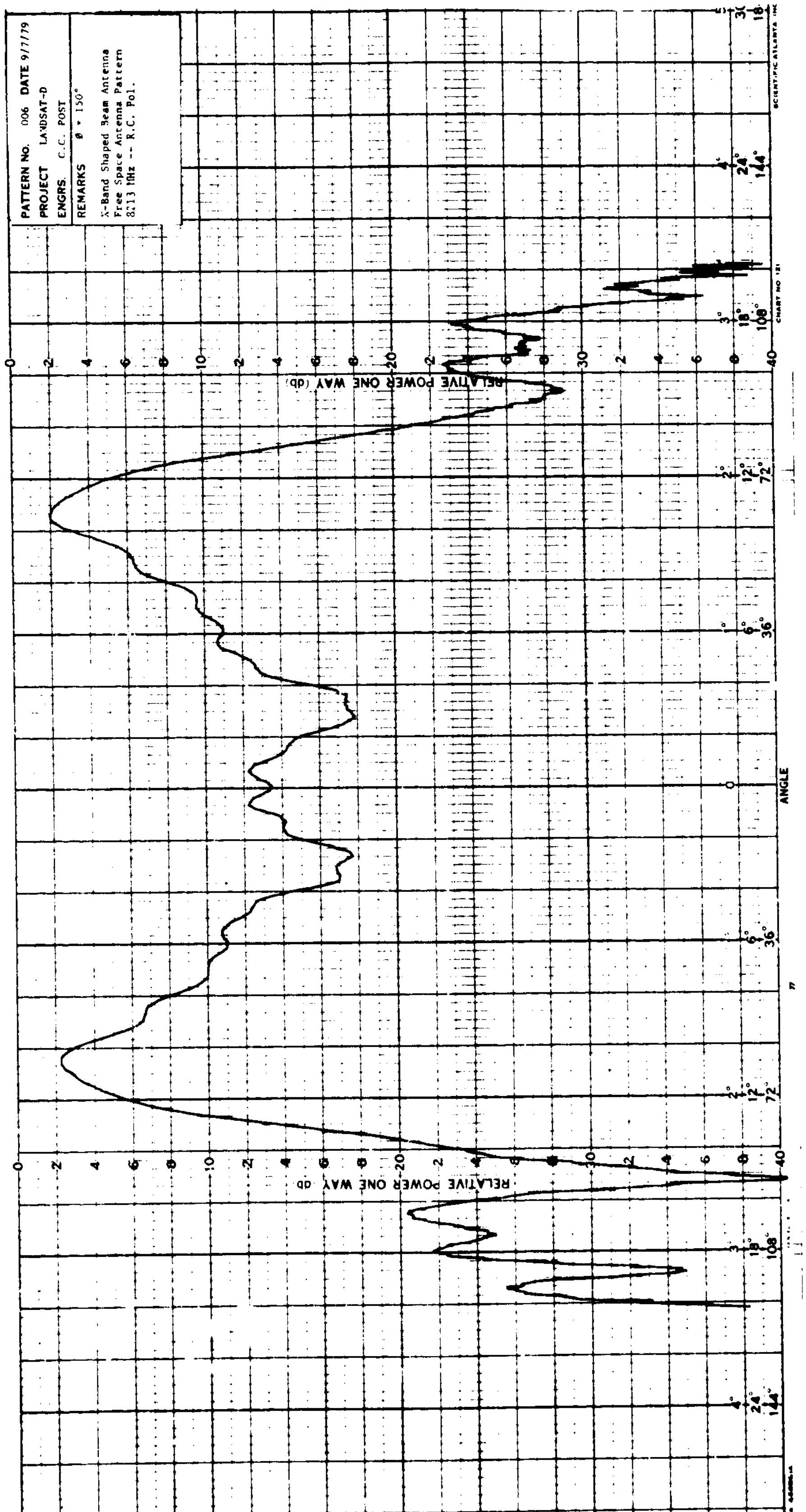

Fig. 147

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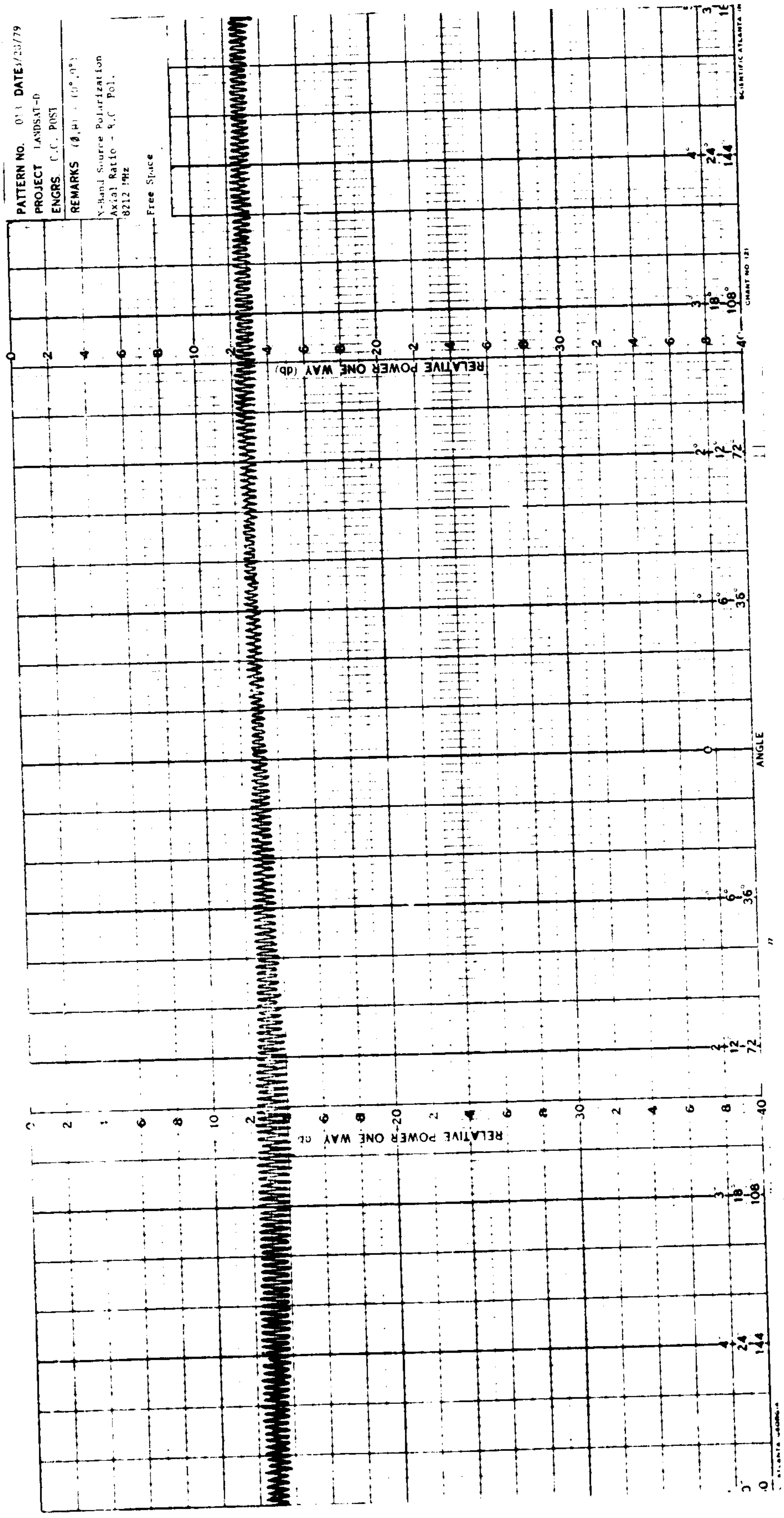

Fig. 148

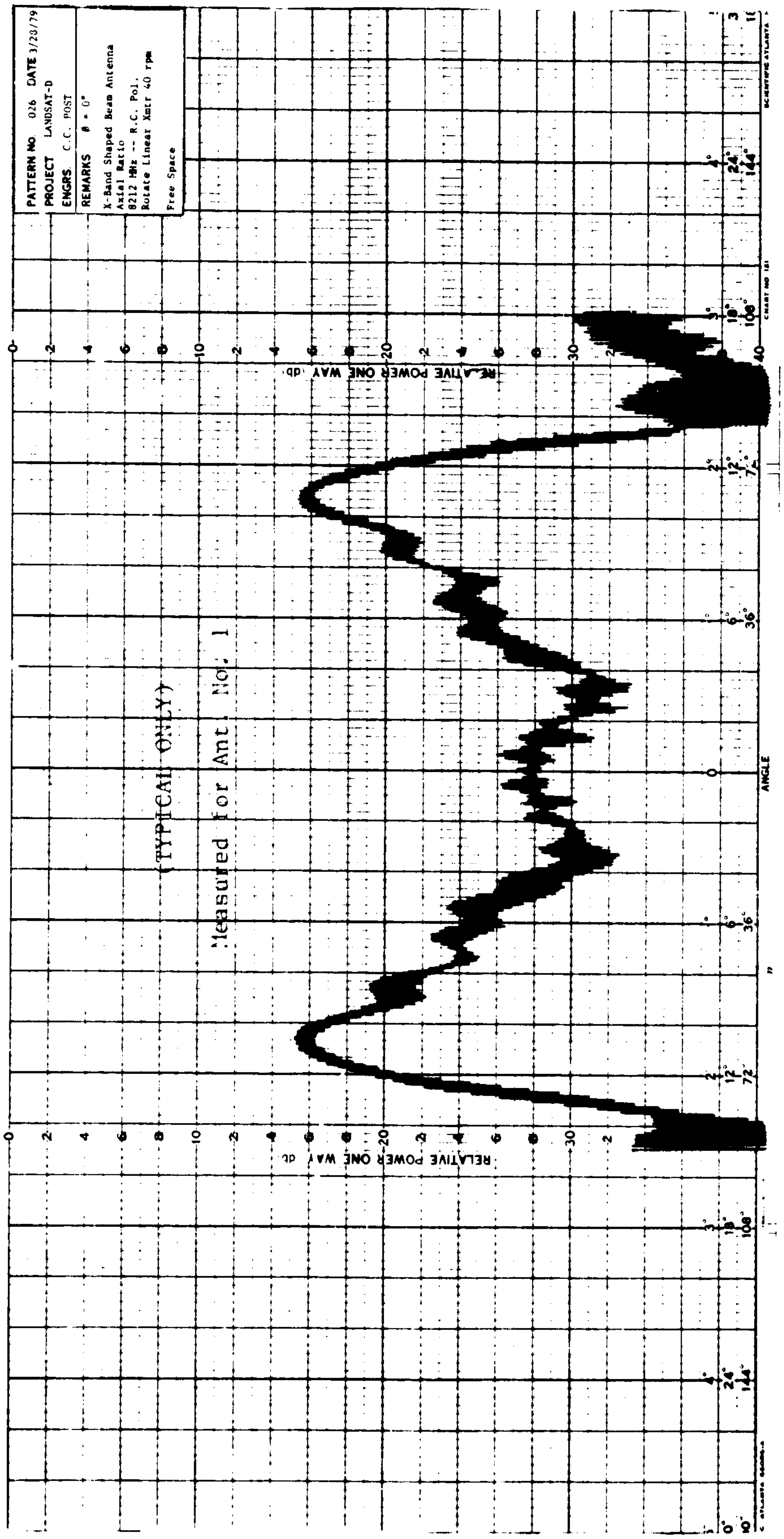
PATTERN NO 026 DATE 3/28/79
PROJECT LANDSAT-D
ENGRS C.C. POST
REMARKS ø = 0°
X-Band Shaped Beam Antenna
Axial Ratio
8212 MHz -- R.C. Pol.
Rotate Linear Xmtr 40 rpm
Free Space
(TYPICAL ONLY)
Measured for Ant. No. 1
RELATIVE POWER ONE WAY, db
ANGLE

Fig. 149

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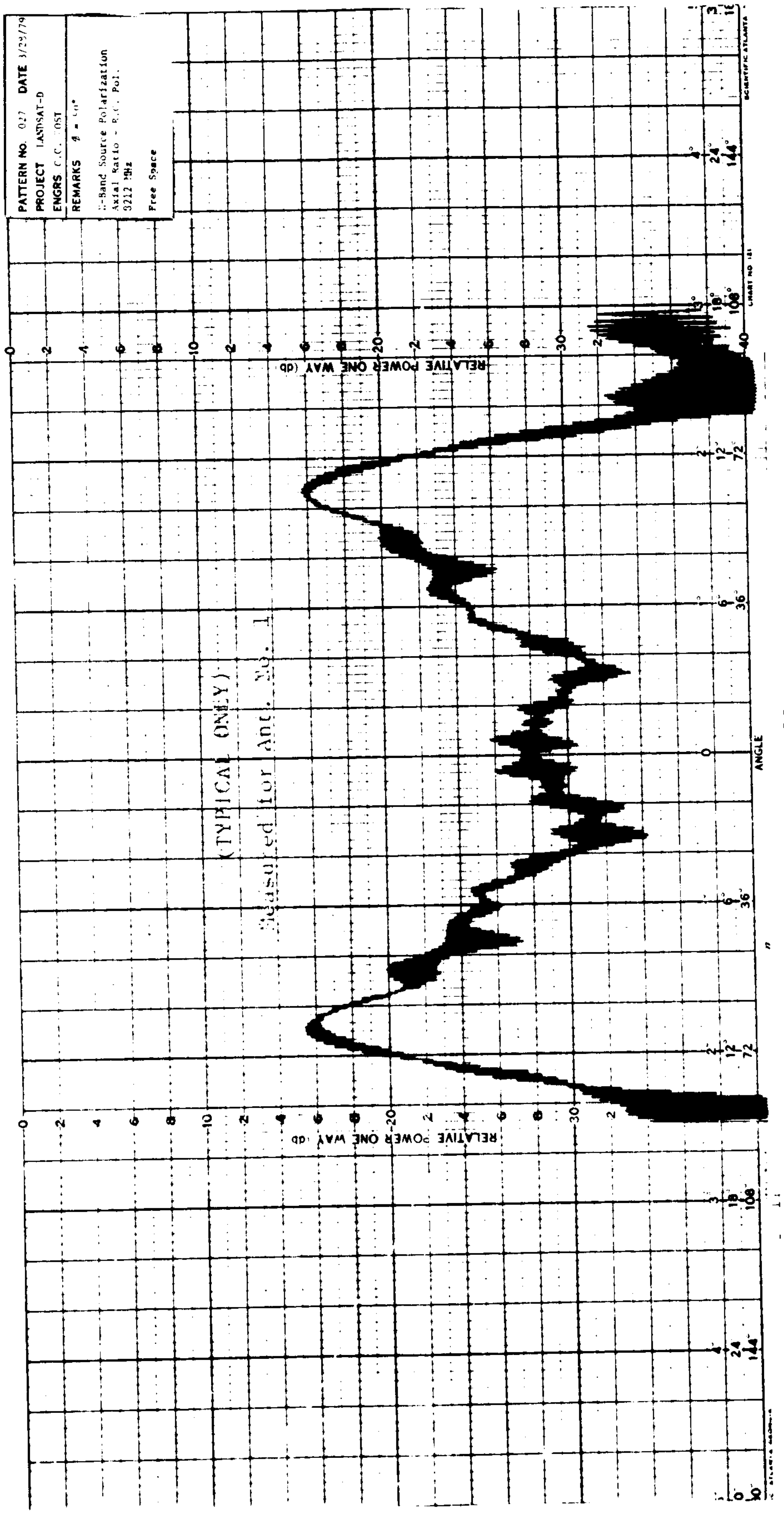

Fig. 150

12.0 ANTENNA PATTERNS UTILIZING FULL SCALE MOCKUP

12.1 Antenna Range

12.1.1 Two range legs were used to complete the required measurements. In cases where the entire vehicle had to be uniformly illuminated with a plane wave over the test model, a 3,000 foot range leg was used. Where feasible - generally for the X-Band antenna - a 160 foot range leg was utilized.

The choice of range leg length is indicated on Chart No. 3; which also outlines all antenna pattern measurements performed except the free-space measurements already presented on Chart No. 2.

Antenna	Freq. (MHz)	Solar Array	High Gain Antenna	Cooler Door	Range Length	Survey Data	Full Set Data	Power Contour Plot Upper Hemis.	Power Contour Plot Lower Hemis.	Peak Gain (dBi)	Look Angle (θ,ϕ)	Remarks
S-Band Shaped Beam No. 1	2266.0	-X	-Z	Open	3000'	Yes	Yes	No	Yes	+6.0	(90°,90°)	
		-X	-Z	Closed	3000'	Yes	Yes	No	Yes	+7.0	(45°,210°)	
		-Z	-Z	Open	3000'	Yes	Yes	No	Yes	+6.0		
		-Z	-Z	Closed	3000'	Yes	No	No	No			
		Removed	Removed	Open	160'	Yes	Yes	No	No	+7.0	(90°,90°)	See Superposition
		Removed	Removed	Closed	160'	Yes	Yes	No	No			
S-Band Shaped Beam No. 2	2260.0	-X	-Z	Open	3000'	Yes	Yes	No		+7.5	(90°,120°)	
		-X	-Z	Closed	3000'	Yes	No	No	No	+7.0		
		-Z	-Z	Open	3000'	Yes	Yes	No	Yes	+6.0	(90°,120°)	
		-Z	-Z	Closed	3000'	Yes	No	No	No			
		Removed	Removed	Open	160'	Yes	Yes	No	No	+7.5	(90°,90°)	
		Removed	Removed	Closed	160'	Yes	Yes	No	No			
S-Band Omni Array Port A	2106.0	-X	-Z	Open	3000'	Yes	Yes	Yes	Yes	+5.0	(90°,60°)	
		-X	-Z	Closed	3000'	Yes	No	No	No			
		-Z	-Z	Open	3000'	Yes	Yes	Yes	Yes	+7.0	(90°,0°)	
		-Z	-Z	Closed	3000'	Yes	No	No	No			
	2287.5	-X	-Z	Open	3000'	Yes	Yes			+4.0	(90°,120°)	
		-X	-Z	Closed	3000'	Yes	No	No	No			
		-Z	-Z	Open	3000'	Yes	Yes	Yes	Yes	+5.0	(90°,90°)	
		-Z	-Z	Closed	3000'	Yes	No	No	No			
S-Band Omni Array Port B	2106.0	-X	-X	Open	3000'	Yes	Yes			+4.0	(90°,30°)	
		-X	-Z	Closed	3000'	Yes	No	No	No			
		-Z	-Z	Open	3000'	Yes	Yes	Yes	Yes	+4.0	(90°,0°)	
		-Z	-Z	Closed	3000'	Yes	No	No	No			

CHART No. 3 - Outline of Antenna Pattern Measurements Performed With Test Vehicle

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Antenna	Freq. (MHz)	Solar Array	High Gain Antenna	Cooler Door	Range Length	Survey Data	Full Set Data	Power Contour Plot Upper Hemis.	Power Contour Plot Lower Hemis.	Peak Gain (dBi)	Look Angle (θ,φ)	Remarks
S-Band Omni Array Port B	2287.5	-X	-Z	Open	3000'	Yes	Yes	Yes	Yes	+4.0	(90°,60°)	
		-X	-Z	Closed	3000'	Yes	No	No	No			
		-Z	-Z	Open	3000'	Yes	Yes	Yes	Yes			
S-Band Omni Unit No. 1	2287.5	-X	-Z	Open	3000'	No	Yes	Yes	Yes	+4.0	(90°,150°)	
S-Band Omni Unit No. 2	2287.5	-X	-Z	Open	3000'	No	Yes	Yes	Yes	+4.0	(90°,90°)	
S-Band Omni Unit No. 3 (First Option)	2287.5	-X	-Z	Open	3000'	No	Yes	Yes	Yes	+5.0	(90°,90°)	
S-Band Omni Unit No. 3 (Second Option)	2287.5	-X	-Z	Open	3000'	No	Yes	Yes	Yes	+7.0	(90°,0°)	
GPS Antenna	1228	-X	-Z	Open	3000'	No	Yes	Yes	No	+9.0	(90°,30°)	
		-Z	-Z	Open	3000'	No	Yes	Yes	No	+9.0	(90°,30°)	
		+Z	-Z	Open	3000'	No	Yes	Yes	No	+9.0	(90°,30°)	
	1575	-X	-Z	Open	3000'	No	Yes	Yes	No	+4.0	(90°,0°)	
		-Z	-Z	Open	3000'	No	Yes	Yes	No	+4.0	(90°,0°)	
		+Z	-Z	Open	3000'	No	Yes	Yes	No	+5.0	(90°,0°)	
X-Band Shaped Beam (No. 2 Breadboard)	8212.5	Removed	Removed	Open	160'	Yes	Yes	No	Yes	+8.3	(64°,0°)	
		Removed	Removed	Closed	160'	Yes	No	No	No			

CHART No. 3 (Continued)

Antenna	Freq. (MHz)	Solar Array	High Gain Antenna	Cooler Door	Range Length	Survey Data	Full Set Data	Power Contour Plot Upper Hemis.	Power Contour Plot Lower Hemis.	Peak Gain (dBi)	Look Angle (θ,φ)	Remarks
X-Band Shaped	8127.5											
Beam Nine Freq.	8148.75											
Survey $\phi = 90°$	8170.0											
Scan Only	8191.25	Removed	Removed	Open	160'	Yes	No	No	No			
	8212.5											
	8233.75											
	8255.0											
	8276.25											
	8297.5											
X-Band Shaped		-Z	-Z	Open	160'	Yes	No	No	No			
Beam Survey to	8212.5	$5\frac{1}{2}° \to -X$	-Z	Open	160'	Yes	No	No	No			
determine Effects		$11° \to -X$	-Z	Open	160'	Yes	No	No	No			
of Reflections		$22\frac{1}{2}° \to -X$	-Z	Open	160'	Yes	No	No	No			
from Solar Array		$22\frac{1}{2}° \to -X$	-Z	Open	160'	Yes	No	No	No			
Alternate Orbit Configuration												
S-Band Omni Array	2288	-X	Stowed	Open	3000'	No	Yes	Yes	Yes			
(port A Only)		-Z	Stowed	Open	3000'	No	Yes	Yes	Yes	+4.0	(90°,180°)	
Simulated Shroud Measurements												
S-Band Omni Unit	2287.5				360'	Yes	No	No	No	+7.0	(90°,120°)	
Survey to Determine				Open	3000'	Yes	No	No	No			
Coupling to the	2106	-X	-Z									
High Gain Antenna			30° Z final									
by the Omni Array												

CHART No. 3 (Continued)

12.2 Definitions of Configurations and Patterns

12.2.1 Flight Configuration

The flight configuration is defined as solar array and High-Gain antenna fully extended. The solar array shall be in two positions: one, pointing toward (-Z); two, pointing toward (-X).

The High-Gain antenna shall point toward (-Z).

12.2.2 Alternate Flight Configuration

The alternate flight configuration is defined as solar array deployed and the High-Gain antenna stowed.

12.2.3 Free Space Patterns

Free space patterns and gain measurements of each antenna (except High-Gain antenna), shall be made in the two principal planes. The pattern measurements shall be made with an RCP reference and the polarization axial ratio shall also be measured.

12.2.4 Survey Patterns

Survey patterns are defined as a set of polar plots of arbitrary number and aspect angle which are used as a design tool in predicting the adequacy of the antenna element design, orientation and the antenna test range effects.

12.2.5 Full Pattern Sets

For the purpose of this specification a full set of pattern data shall be defined as a set of polar plots, taken with the specified polarization (IEEE definition), for $\phi = 0°$ to $180°$ in $10°$ increments for a total of 19 antenna pattern plots.

12.2.6 Power Contour Graph

Power contour graphs, using equi-area format, shall be prepared for each full pattern set and each polarization and each hemisphere specified.

12.2.7 Gain Measurements

Antenna gain shall be measured for each antenna system at the frequencies specified. Gain shall be measured relative to a standard gain reference antenna. The measured gain shall be stated for a particular direction of look; usually in the direction of maximum signal as determined from antenna pattern polar plots. Antenna gain shall be referenced at the antenna input connectors excepting the S-Band Omni Array which shall be referenced to the two inputs of the hybrid of the combiner.

> Note: By direction from the General Electric Company Cognizant Engineer the S-Band Omni Array gain is referenced to the unit antennas input connector. The line loss of the array harness was removed from the calculation.

12.2.8 Thematic Mapper (TM) Cooler Door

All defined patterns and plots shall be made with the TM cooler door in the normal flight position (open). Survey patterns for antennas, with the exception of GPS, shall also be made with the TM door closed.

No effects noted except for S-Band Shaped Beam No. 1. A full set of data were measured for this antennas and a power contour was plotted.

12.3 S-Band Shaped Beam Antenna No. 1 - Cooler Door Open
Antenna Patterns - 2265.5 MHz - Solar Array (-X)

12.3.1 R.C. Polarization
High-Gain Antenna (-Z)
Cooler Door Open
Antenna Range Leg Length - 3000 feet

12.3.2 This antenna is mounted adjacent to the Thematic Mapper Cooler and is the only antenna on board which showed any influence by opening and closing the door. A full set of data were measured for the (-X) case. Power Contour graphs are plotted for each case.

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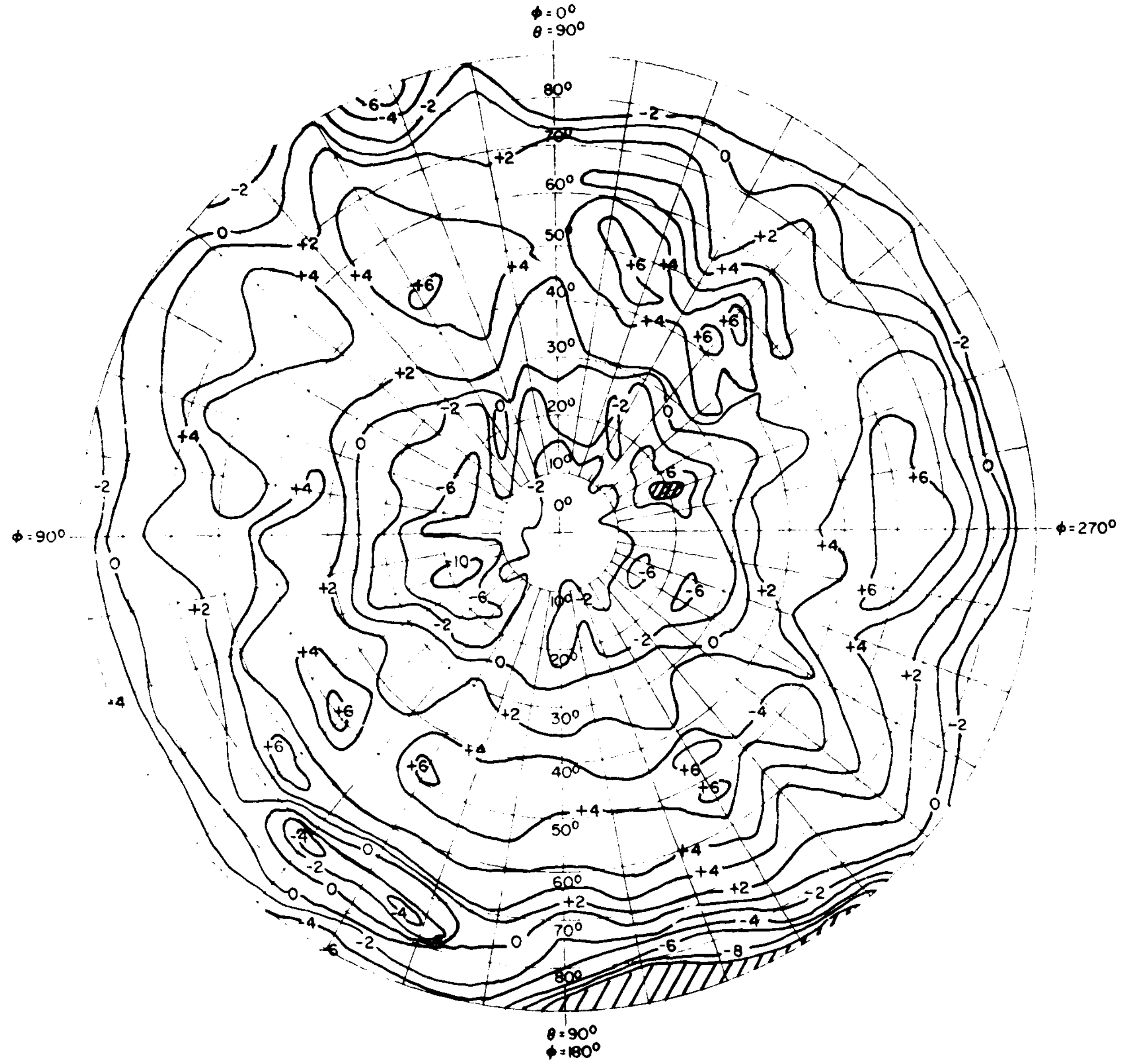

FIG. NO. 151 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT-D	POLARIZATION	R.C.
ANTENNA	S-Band Shaped Beam #1	GAIN REFERENCE	SGH-1.7
FREQUENCY	2266 MHz	ENGINEER	C. C. Post
MODEL SCALE	FULL		
REMARKS			
SOLAR PANEL (-X)			
HIGH-GAIN ANTENNA (-Z)			
THEMATIC MAPPER COOLER DOOR OPEN (COMPARE FIGURE 160)			

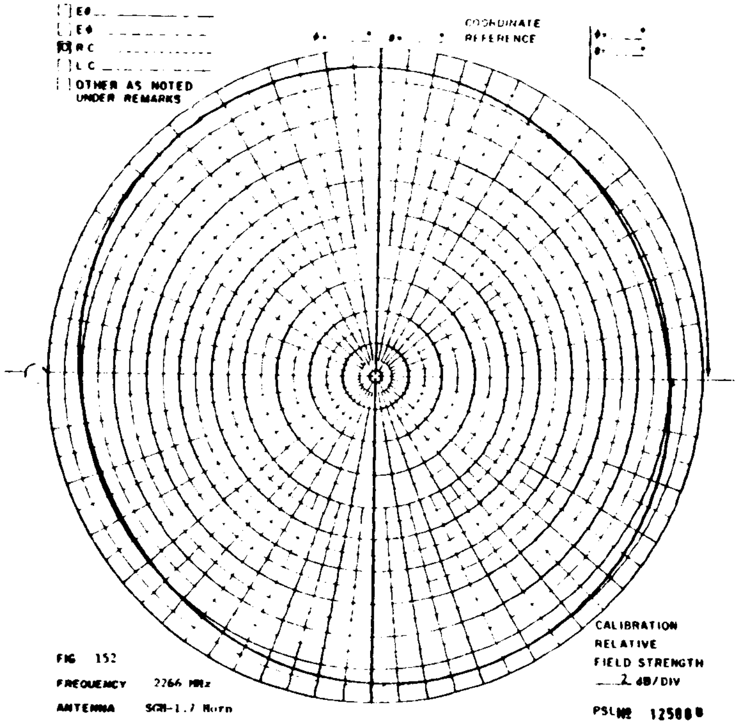

FIG 152
FREQUENCY 2266 MHz
ANTENNA SGH-1.7 Horn
REMARKS Source Polarization

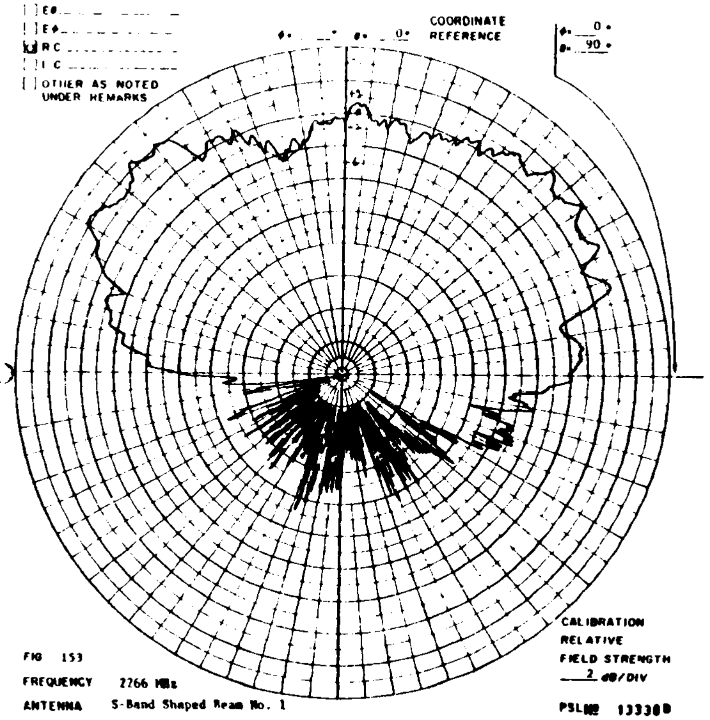

FIG 153
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 1
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Open

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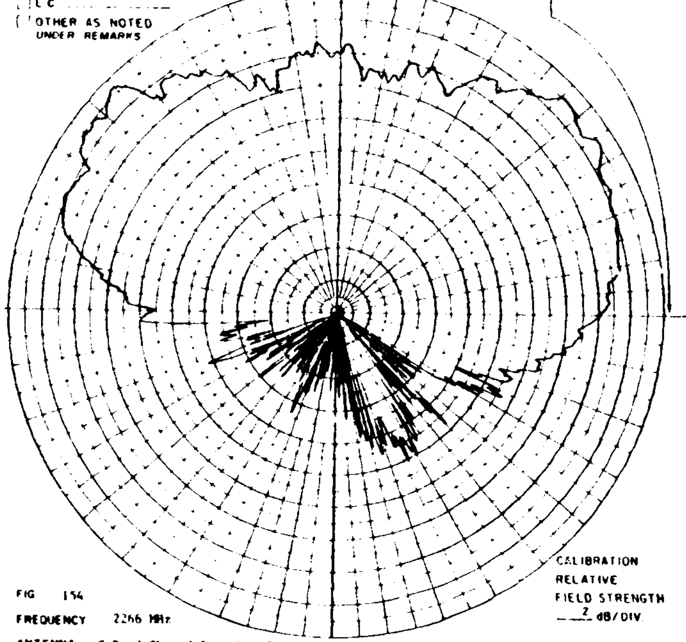
POLARIZATION
- [ ] GAIN REF
- [ ] Eθ
- [ ] Eφ
- [x] RC
- [ ] LC
- [ ] OTHER AS NOTED UNDER REMARKS

θ = __ ° φ = 0° COORDINATE REFERENCE | φ = 30° θ = 90°



CALIBRATION RELATIVE FIELD STRENGTH 2 dB/DIV

PSL№ 133350

FIG 154

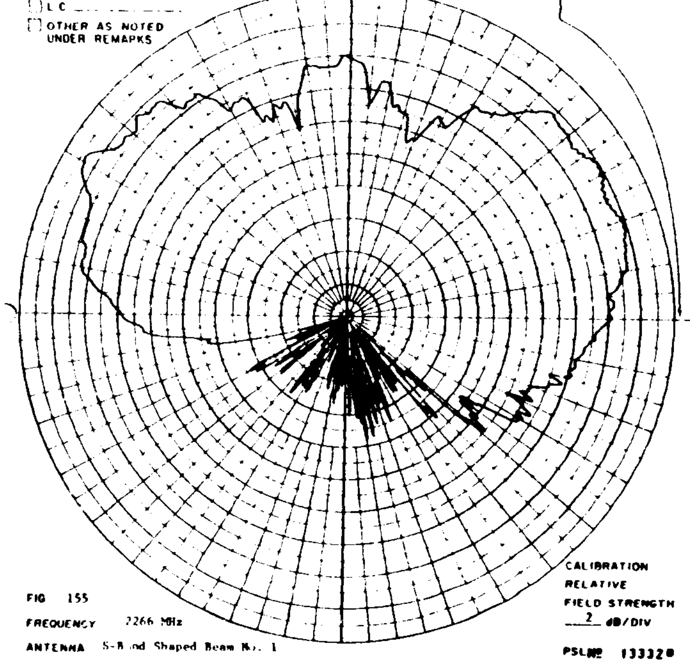
FREQUENCY 2266 MHz

ANTENNA S-Band Shaped Beam No. 1

REMARKS Solar Array (-X)
High Gain An[illegible] (-Z)
Cooler D[illegible]

POLARIZATION
- [ ] GAIN REF
- [ ] Eθ
- [ ] Eφ
- [x] RC
- [ ] LC
- [ ] OTHER AS NOTED UNDER REMARKS

θ = __ ° φ = 0° COORDINATE REFERENCE | φ = 60° θ = 90°



CALIBRATION RELATIVE FIELD STRENGTH 2 dB/DIV

PSL№ 133320

FIG 155

FREQUENCY 2266 MHz

ANTENNA S-Band Shaped Beam No. 1

REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Open

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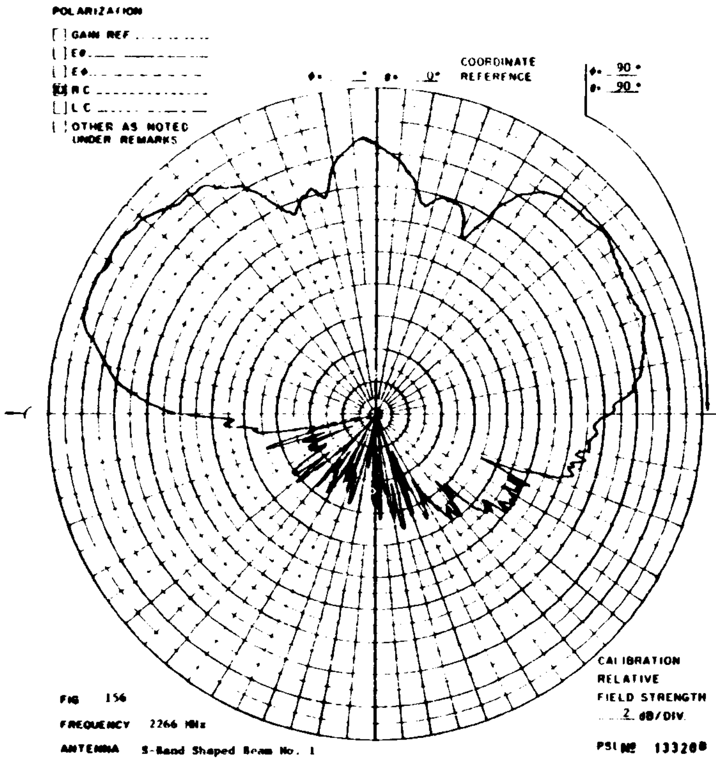

FIG 156
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 1
REMARKS Solar Array (-X) High Gain Antenna (-Z) Cooler Door Open

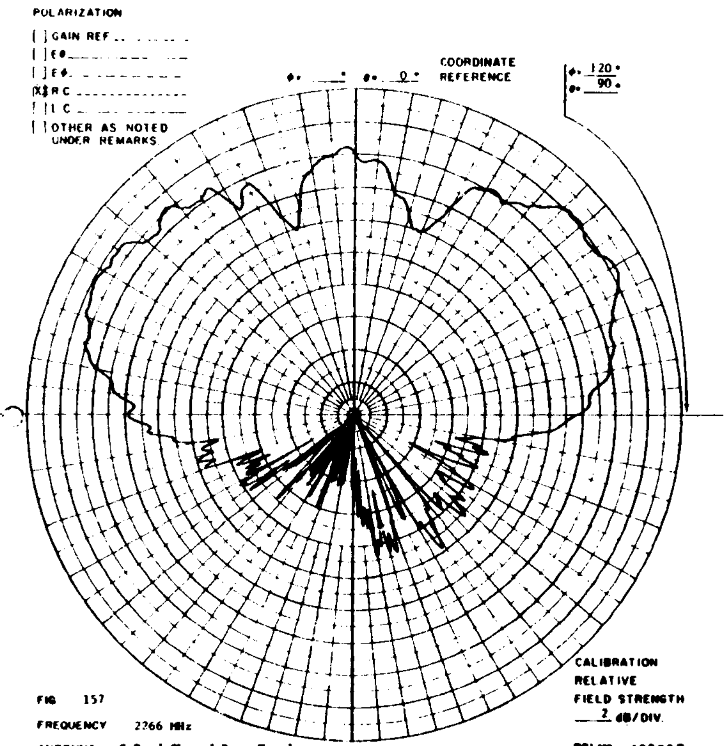

FIG 157
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 1
REMARKS Solar Array (-X) High Gain Antenna (-Z) Cooler Door Open

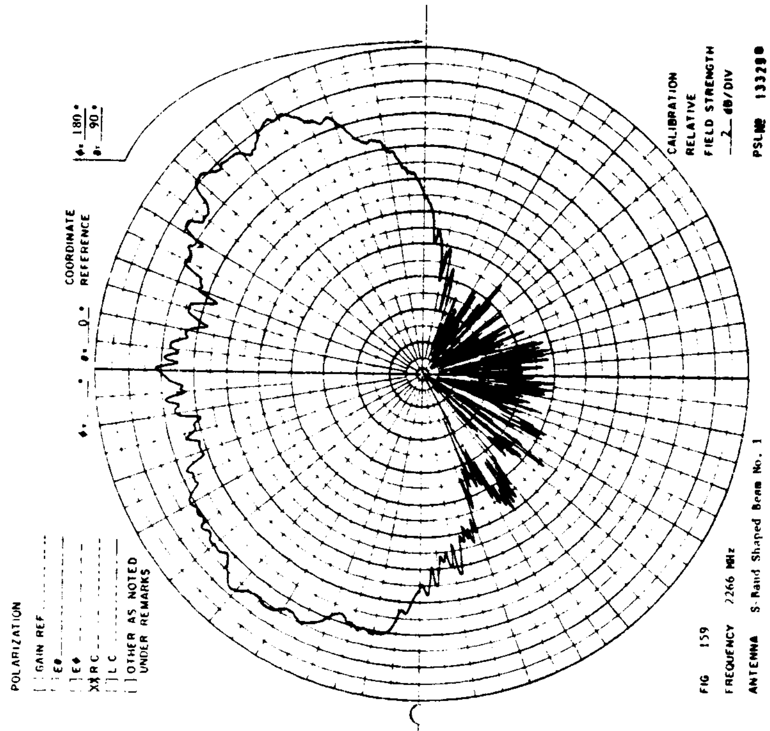

FIG 159
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 1
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Open

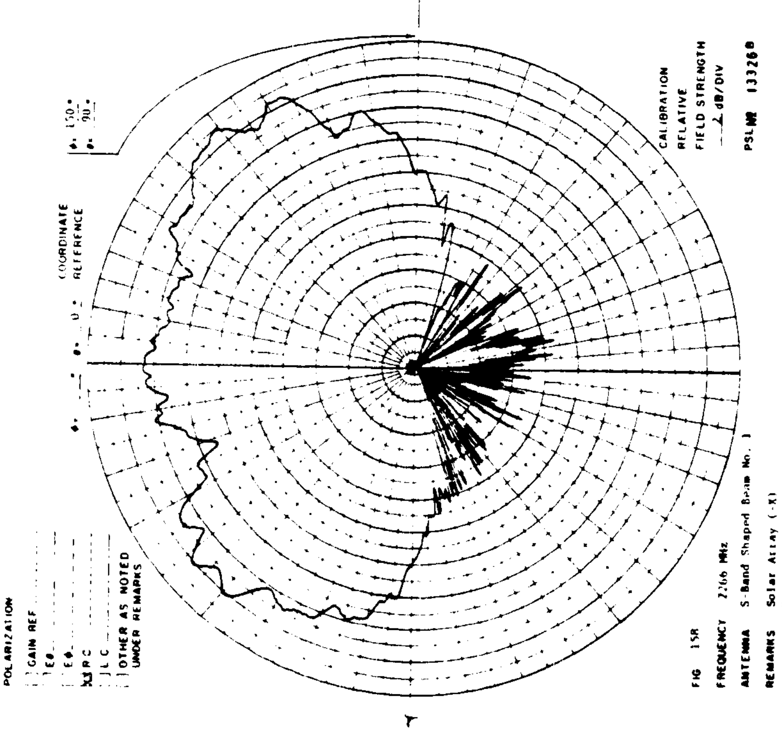

FIG 158
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 1
REMARKS Solar Array (-X)
High Gain Antenna (-Z)

12.4 S-Band Shaped Beam Antenna No. 1 - Cooler Door Closed - Antenna Patterns - 2266 MHz - Solar Array (-X)

12.4.1 R.C. Polarization
High-Gain Antenna (-Z)
Antenna Range Leg Length - 3000 Feet

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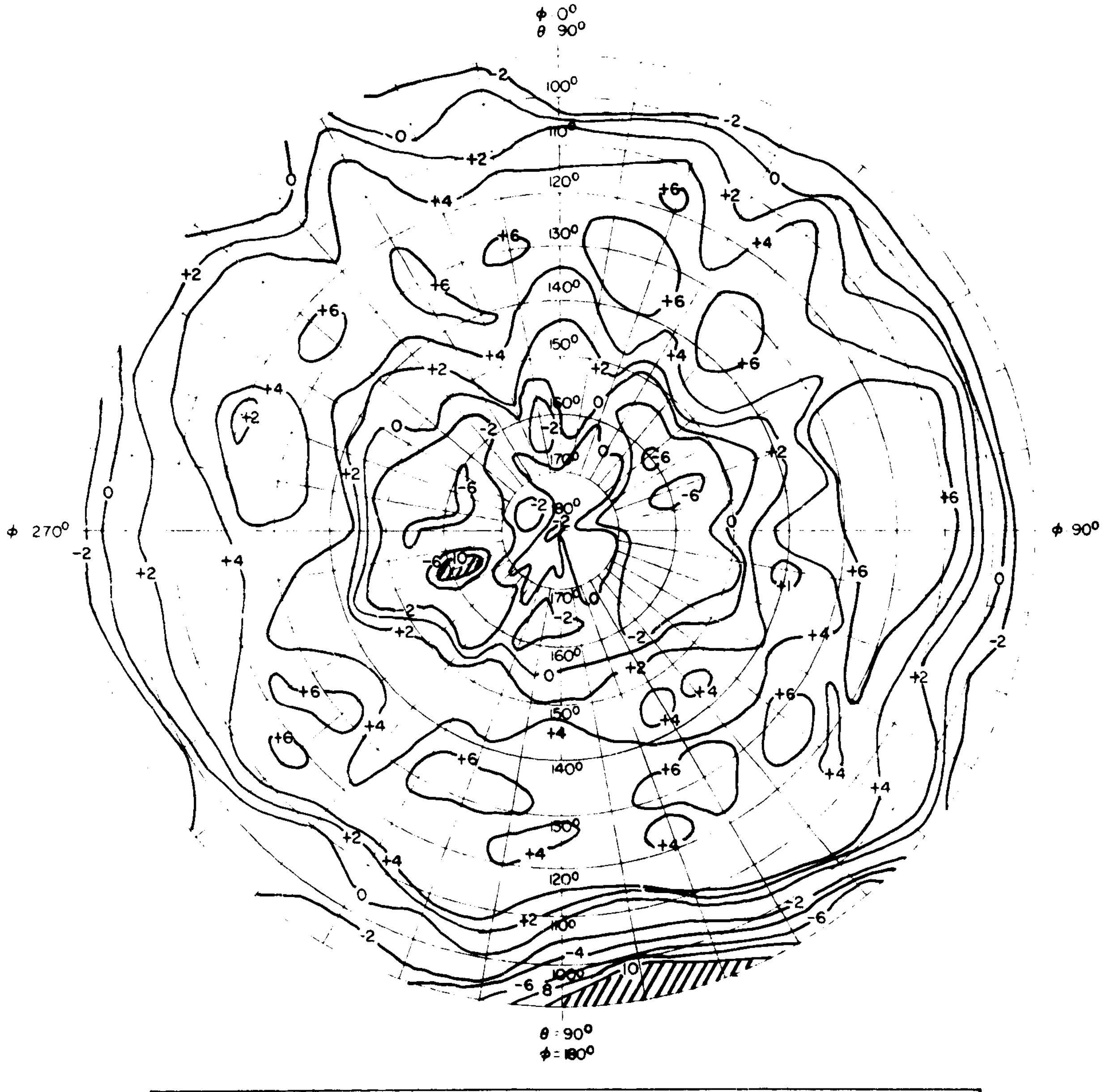

FIG. NO. 160 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT-D	POLARIZATION	R.C.
ANTENNA	S-Band Shaped Beam #1	GAIN REFERENCE	SGH 1.7
FREQUENCY	2266 MHz	ENGINEER	C. C. Post
MODEL SCALE	FULL		
REMARKS			
SOLAR PANEL (-X)			
HIGH-GAIN ANTENNA (-Z)			
THEMATIC MAPPER COOLER DOOR CLOSED (COMPARE FIGURE 151)			

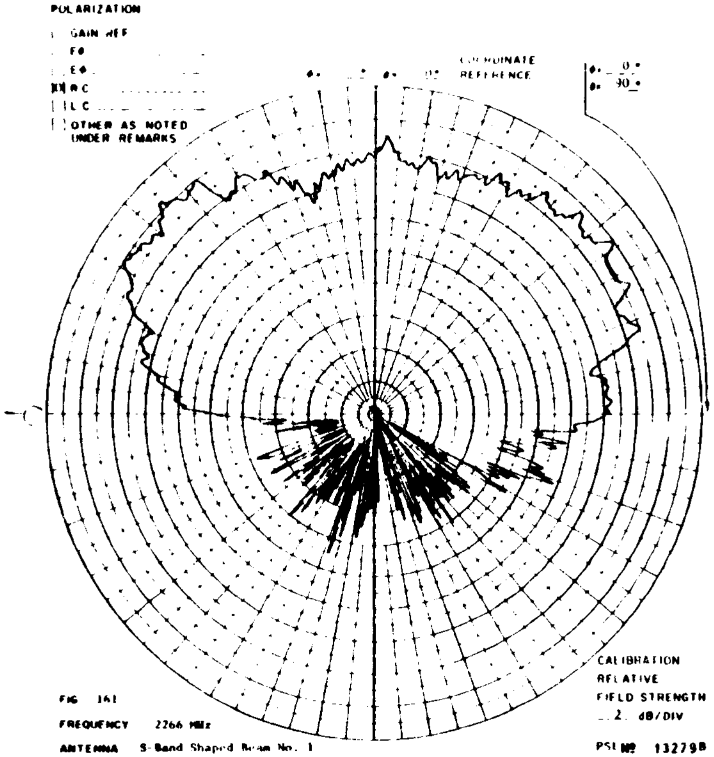

FIG 161
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 1
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Closed

CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
PSI № 13279B

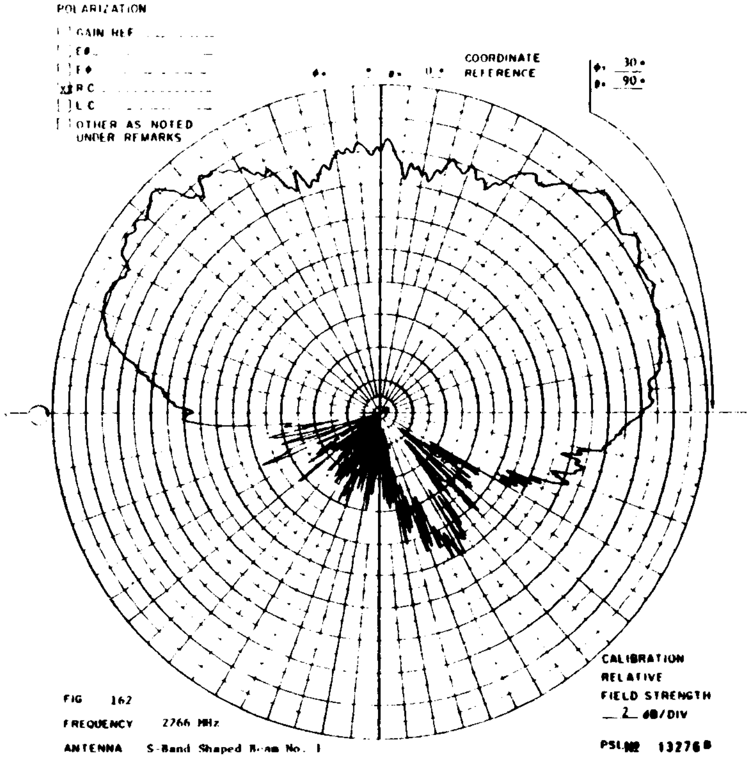

FIG 162
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 1
REMARKS Solar Array (X)
High Gain Antenna (-Z)
Cooler Door Closed

CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
PSI № 13276B

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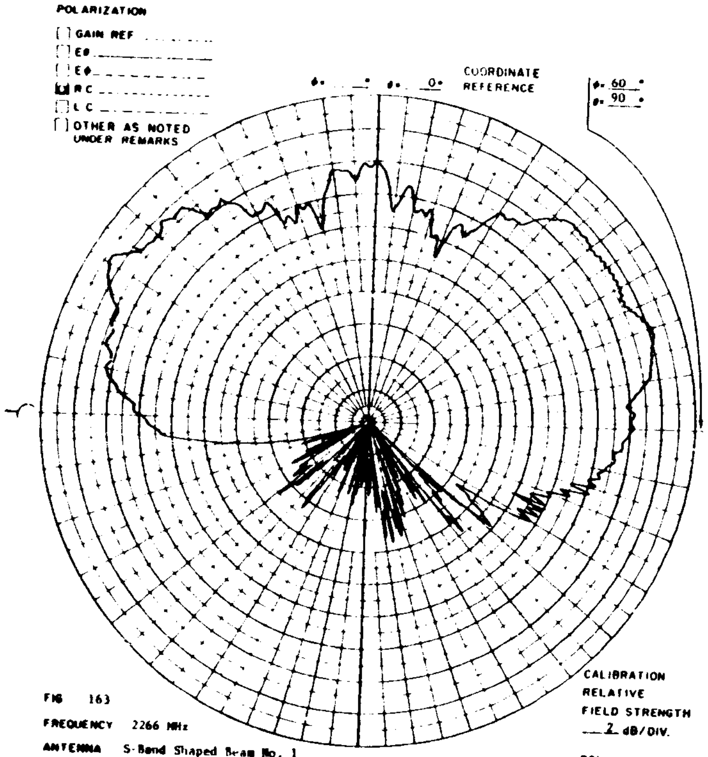

FIG 163
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 1
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Closed

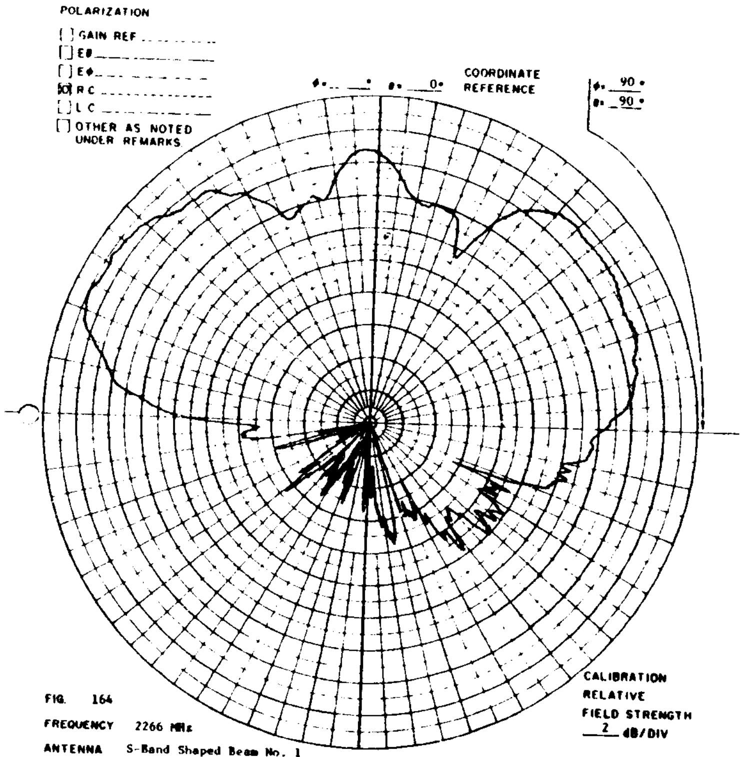

FIG. 164
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 1
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Closed

POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[X] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

φ = ___° θ = 0° COORDINATE REFERENCE
φ = 120°
φ = 90°

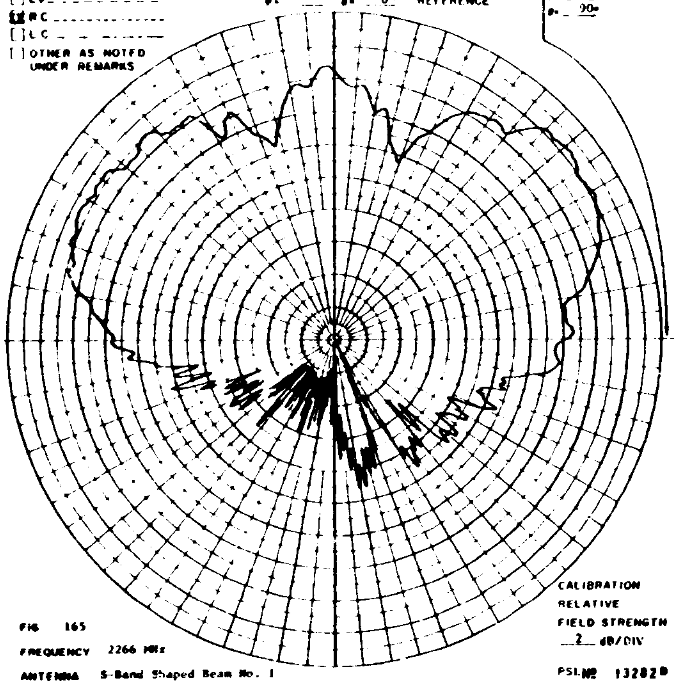

FIG 165
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 1
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Closed

CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
PSL№ 13282●

POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[X] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

φ = ___° θ = 0° COORDINATE REFERENCE
φ = 150°
φ = 90°

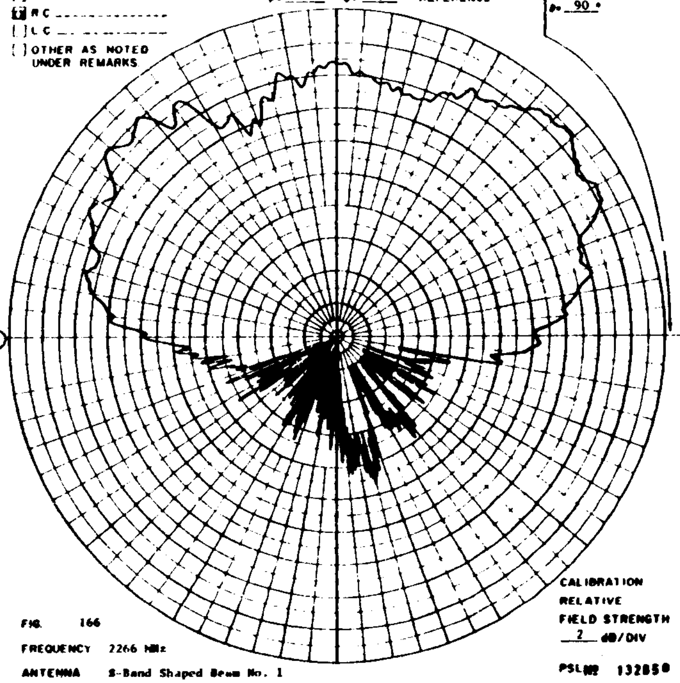

FIG. 166
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 1
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Closed

CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
PSL№ 13285●

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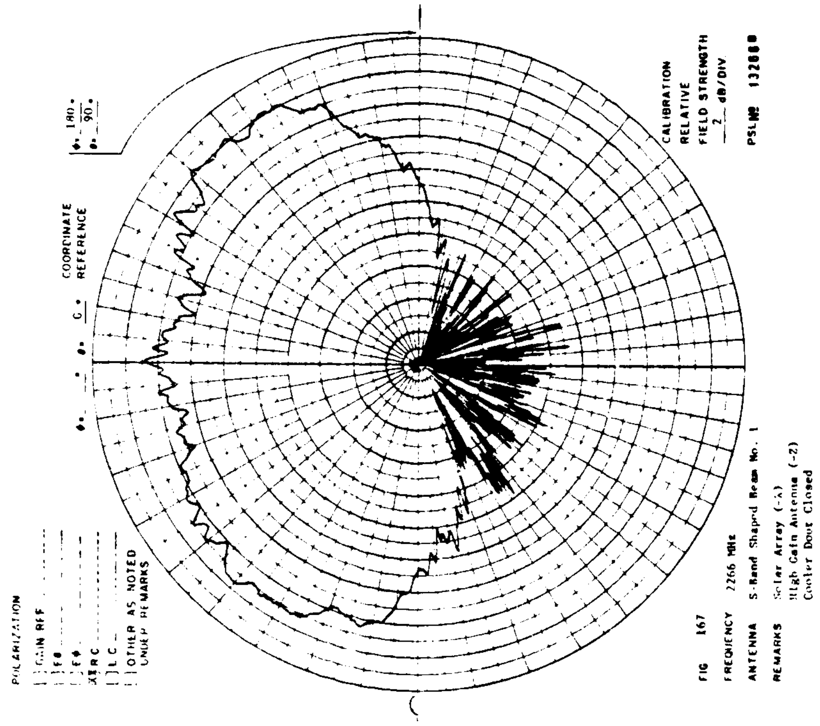

12.5 S-Band Shaped Beam Antenna No. 1 - Cooler Door Closed - Antenna Patterns - 2266 MHz - Solar Array (-Z)

12.5.1 R.C. Polarization
High-Gain Antenna (-Z)
Antenna Range Leg Length - 3000 Feet

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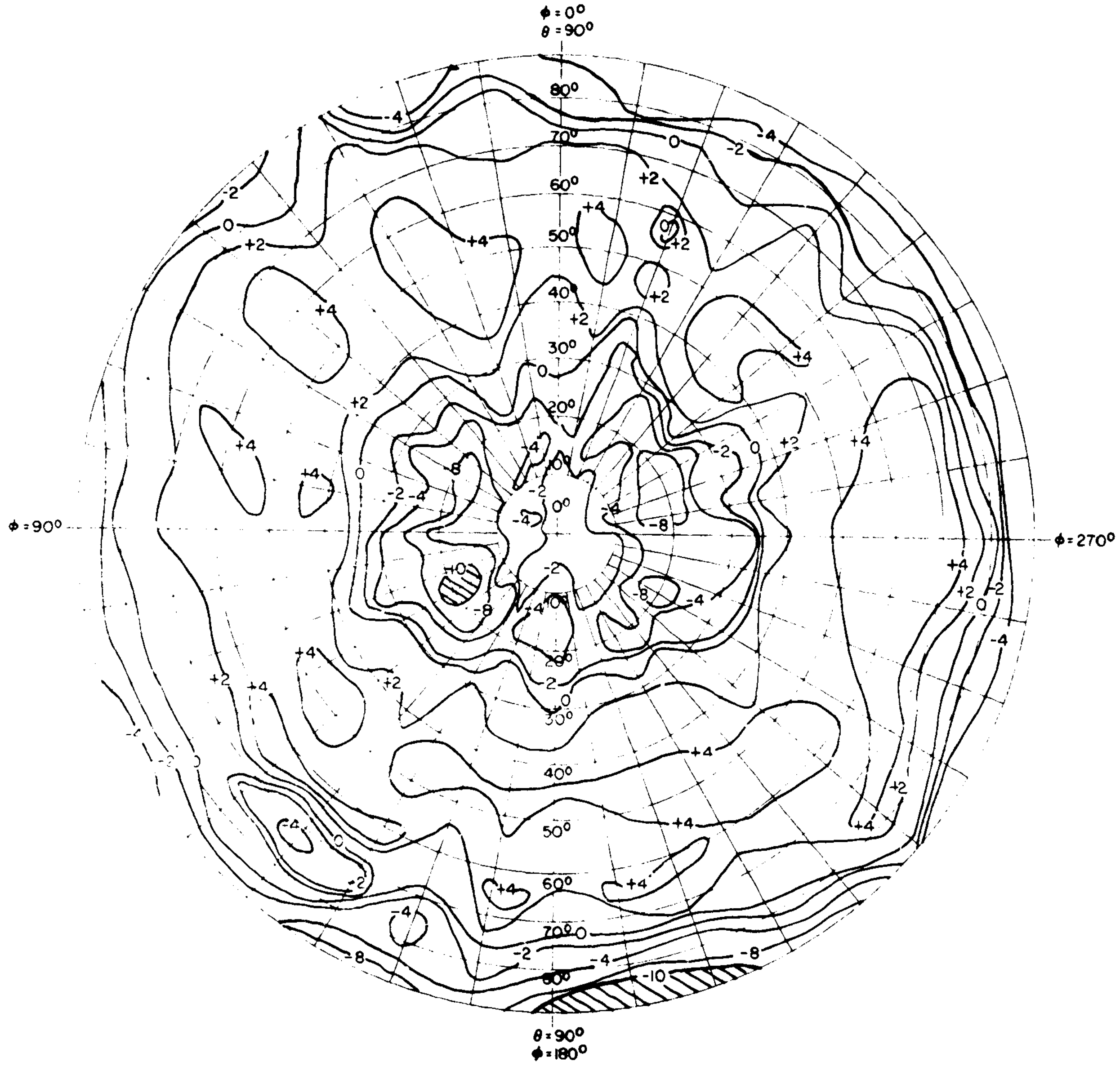

FIG. NO. 168 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT D	POLARIZATION	R.C
ANTENNA	S Band Shaped Beam No. 1	GAIN REFERENCE	SGH L.7 HORN
FREQUENCY	2266 MHz	ENGINEER	C. C. Post
MODEL SCALE			
REMARKS			
	SOLAR ARRAY (-Z)		
	HIGH GAIN ANTENNA (-Z)		
	COOLER DOOR OPEN		

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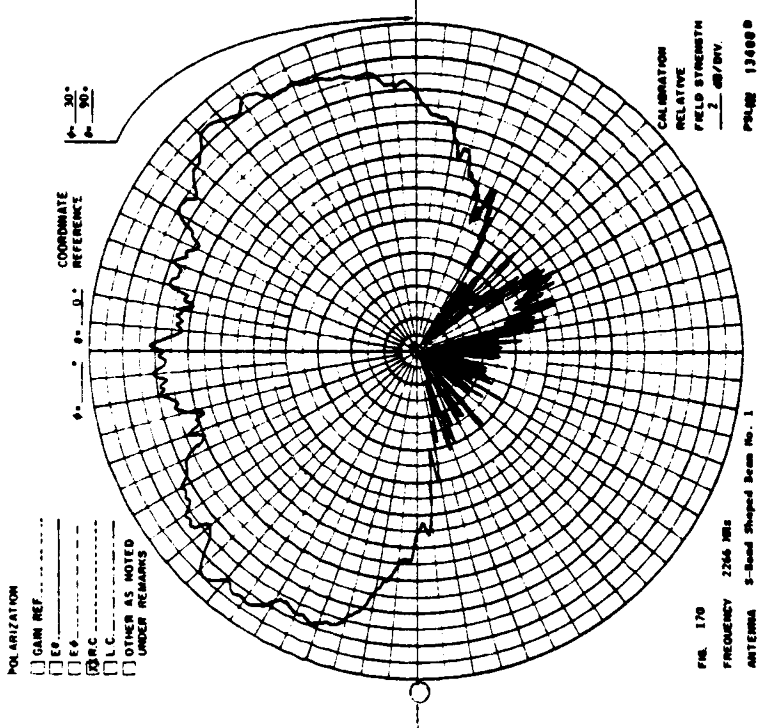

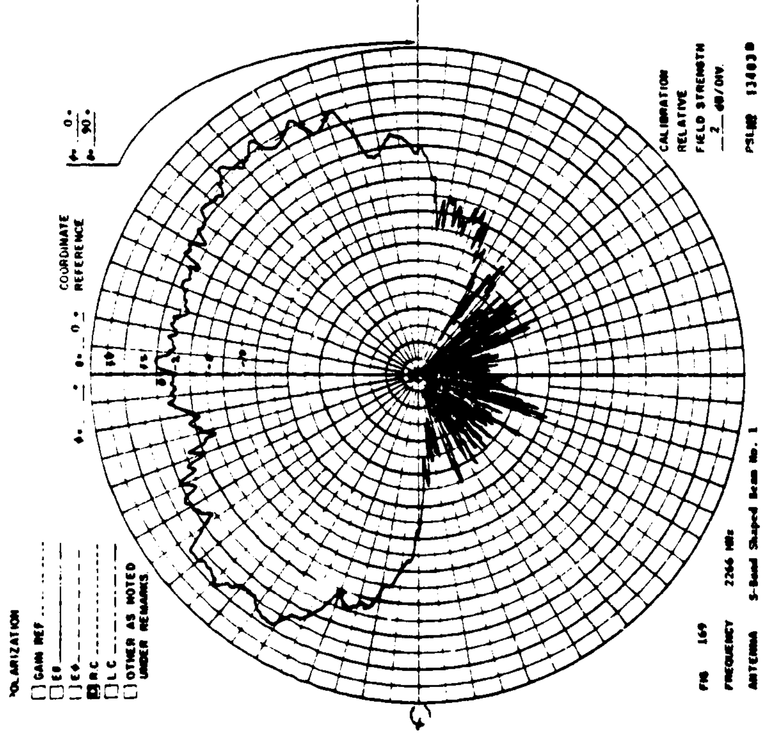

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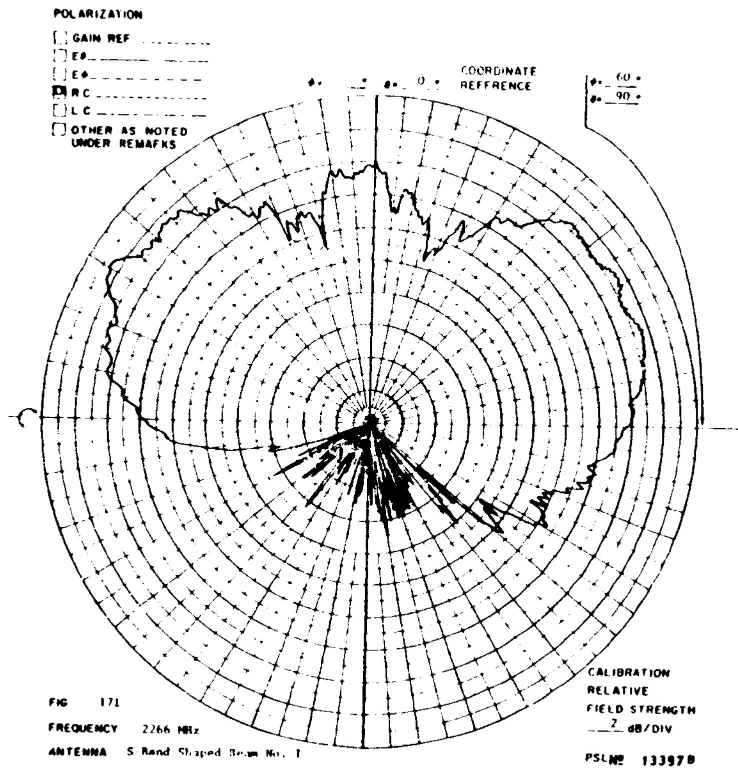

FIG 171

FREQUENCY 2266 MHz

ANTENNA S Band Shaped Beam No. 1

REMARKS Solar Array (-Z)
High Gain Antenna (-Z)
Cooler Door Open

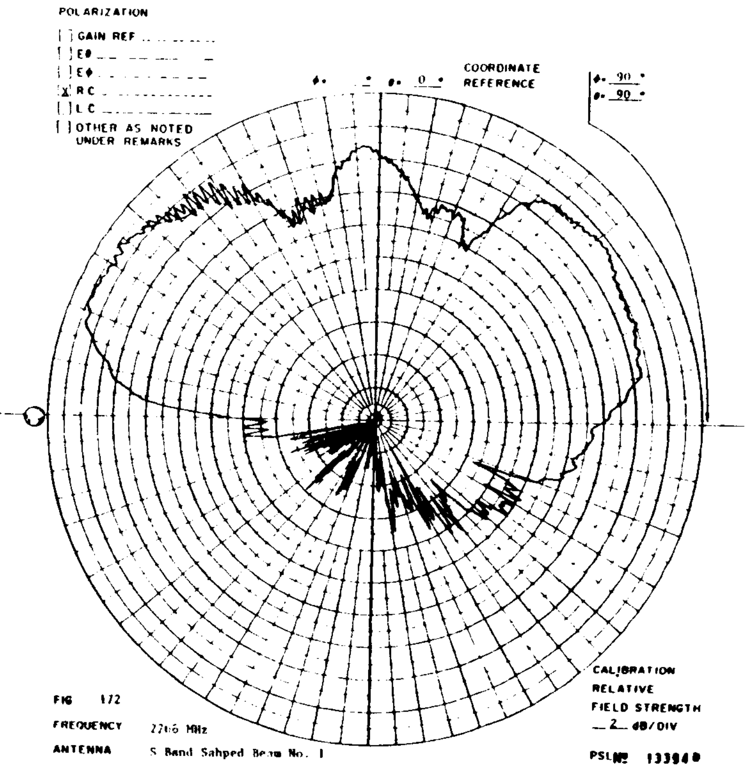

FIG 172

FREQUENCY 2266 MHz

ANTENNA S Band Sahped Beam No. 1

REMARKS Solar Array (-Z)
High Gain Antenna (-Z)
Cooler Door Open

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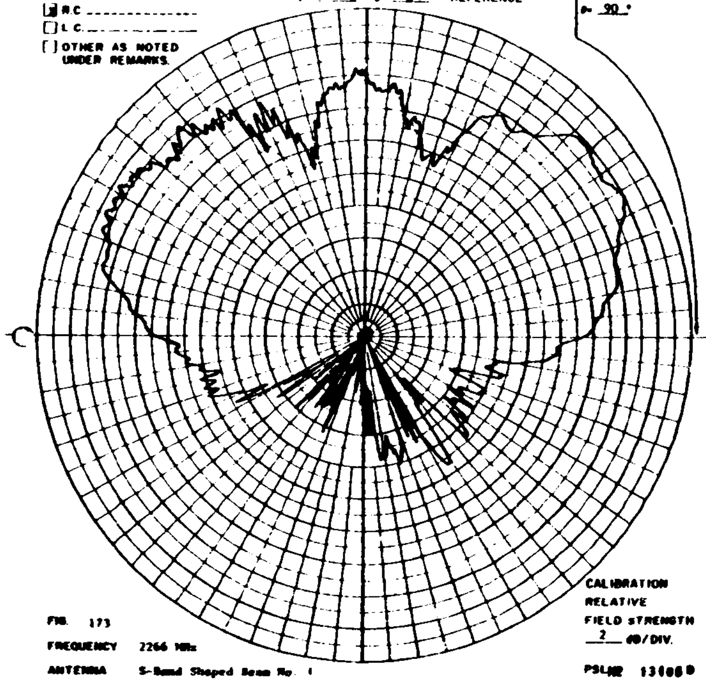
POLARIZATION
- [ ] GAIN REF
- [ ] Eθ
- [ ] Eϕ
- [x] R.C.
- [ ] L.C.
- [ ] OTHER AS NOTED UNDER REMARKS.

θ= ___° ϕ= 0° COORDINATE REFERENCE

θ= 120°
ϕ= 90°



CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.

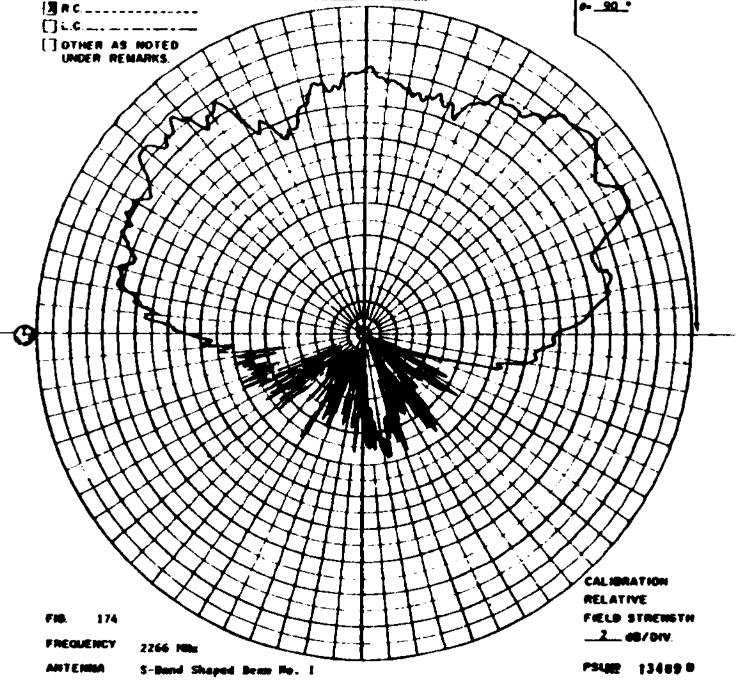
PSL№ 13408 D

FIG. 173
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 1
REMARKS Solar Array (-Z)
High Gain Antenna (-Z)
Cooler Door Open

POLARIZATION
- [ ] GAIN REF
- [ ] Eθ
- [ ] Eϕ
- [x] R.C.
- [ ] L.C.
- [ ] OTHER AS NOTED UNDER REMARKS.

θ= ___° ϕ= 0° COORDINATE REFERENCE

θ= 150°
ϕ= 90°



CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.

PSL№ 13409 D

FIG. 174
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 1
REMARKS Solar Array (-Z)
High Gain Antenna (-Z)
Cooler Door Open

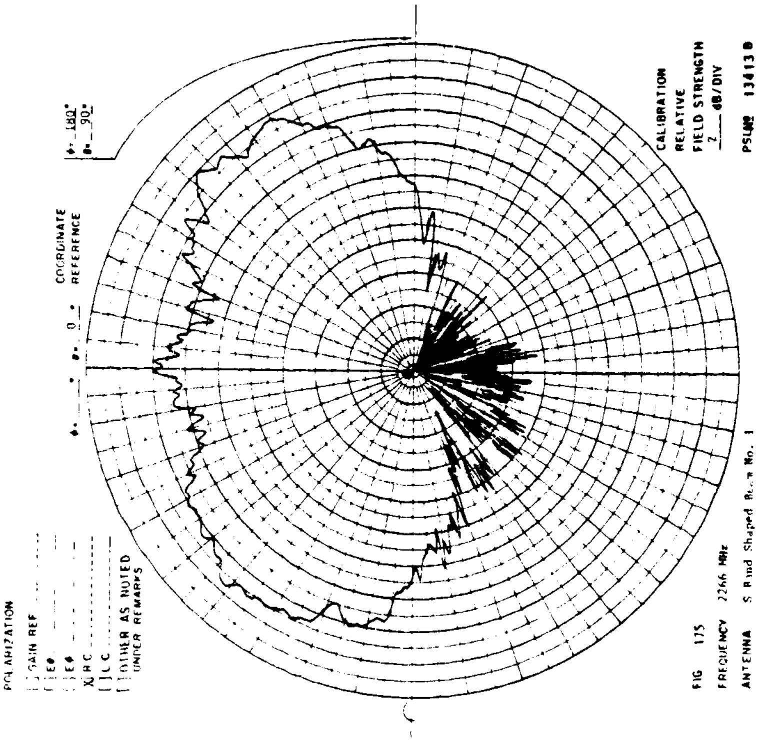


FIG 175
FREQUENCY 2266 MHz
ANTENNA S Band Shaped Beam No. 1
REMARKS Solar Array (-Z)
High Gain Antenna (-Z)
Cooler Door Open

12.6 S-Band Shaped Beam Antenna No. 1 - Cooler Door Open
Special Test - 160 Foot Antenna Range - 2266 MHz
Solar Array and High-Gain Antenna Removed

12.6.1 As a special test full sets of data were measured for S-Band Shaped Beam Antenna No. 1 on the shorter, 160 foot, antenna range with both the High-Gain Antenna and the Solar Array removed. Power Contour plots were not made for these data. The dashed line data on Fig.'s 177 through 183 are data measured on the 3,000 foot antenna range with the Solar Array at (-X) and the High-Gain Antenna at (-Z).

C-3

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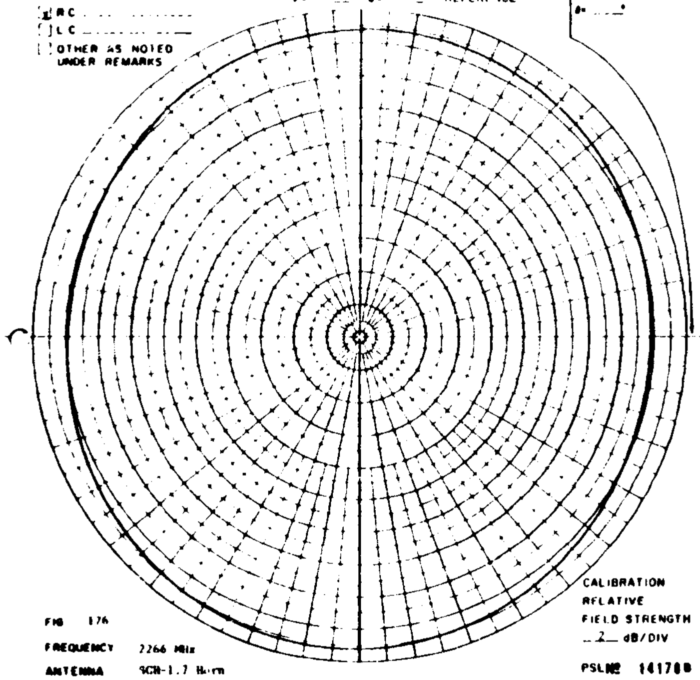
POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[x] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

COORDINATE REFERENCE



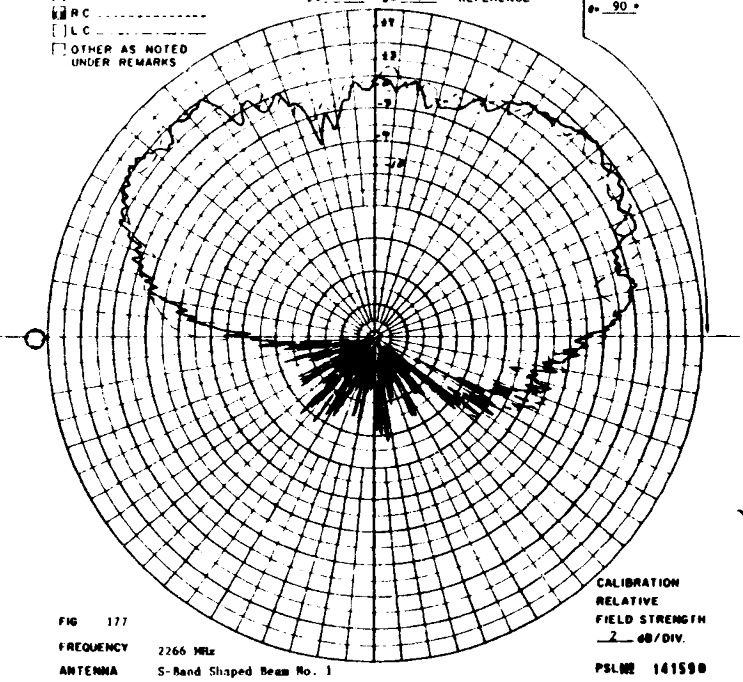
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV

FIG 176
FREQUENCY 2266 MHz
ANTENNA SGH-1.7 Horn
REMARKS Circularity of Source
Source is an 8 Turn Helix Antenna
2.3dB

PSL№ 141788

POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[x] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

COORDINATE REFERENCE
φ = 0°
θ = 90°



CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.

FIG 177
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 1
REMARKS Solar Array Removed
High Gain Antenna Removed
Cooler Door Open
160 Foot Range Length Solid Line
(300 Foot Range Length Dashed Line)

PSL№ 141598

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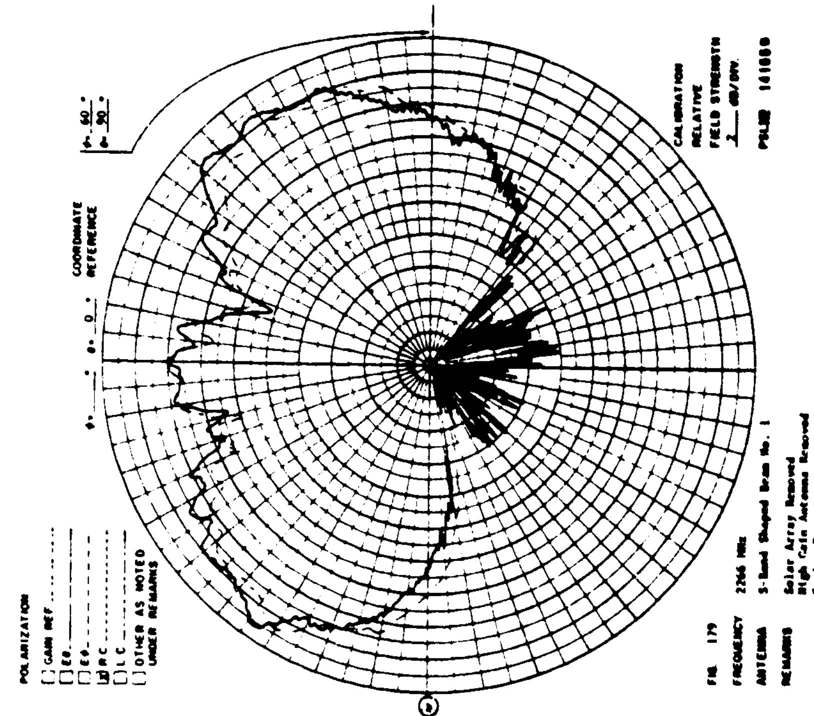

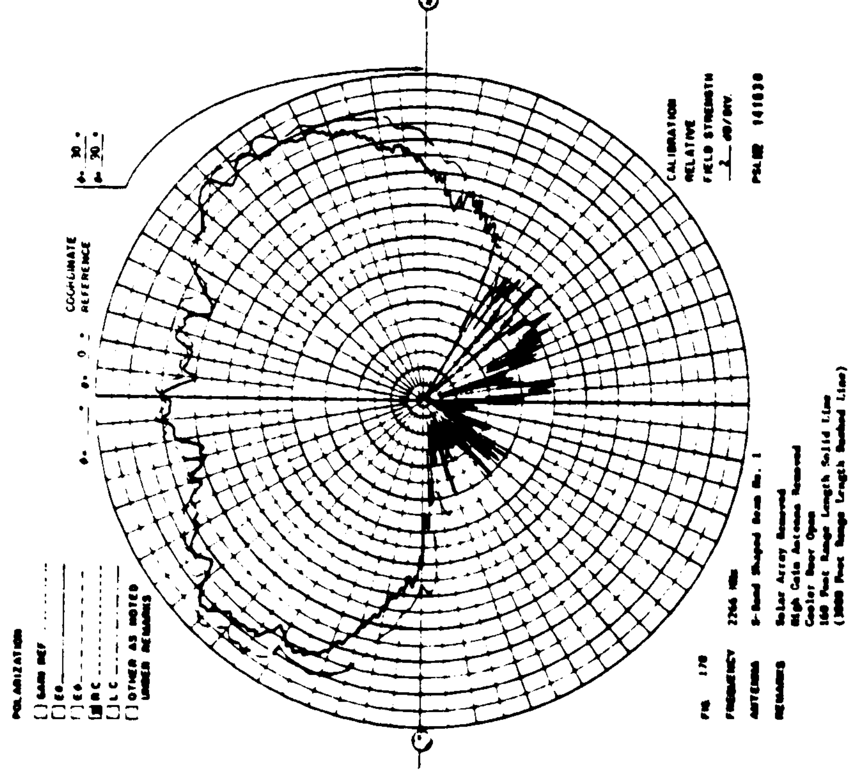

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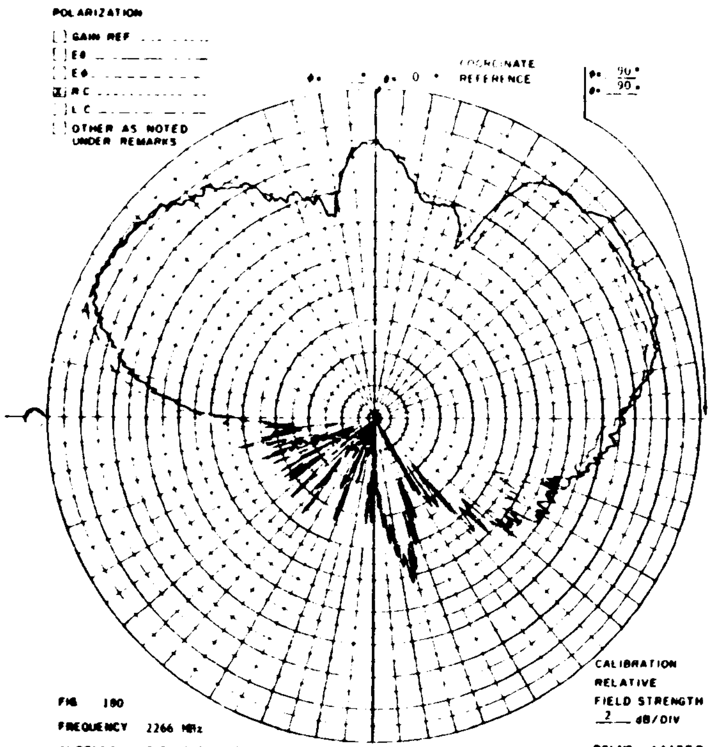

FIG 180
FREQUENCY 2266 MHz
ANTENNA S Band Shaped Beam No. 1
REMARKS Solar Panel Removed
High Gain Antenna Removed
Cooler Door Open
(3000 Foot Range Length Dashed Line)
160 Foot Range Length Solid Line

PSL№ 141578

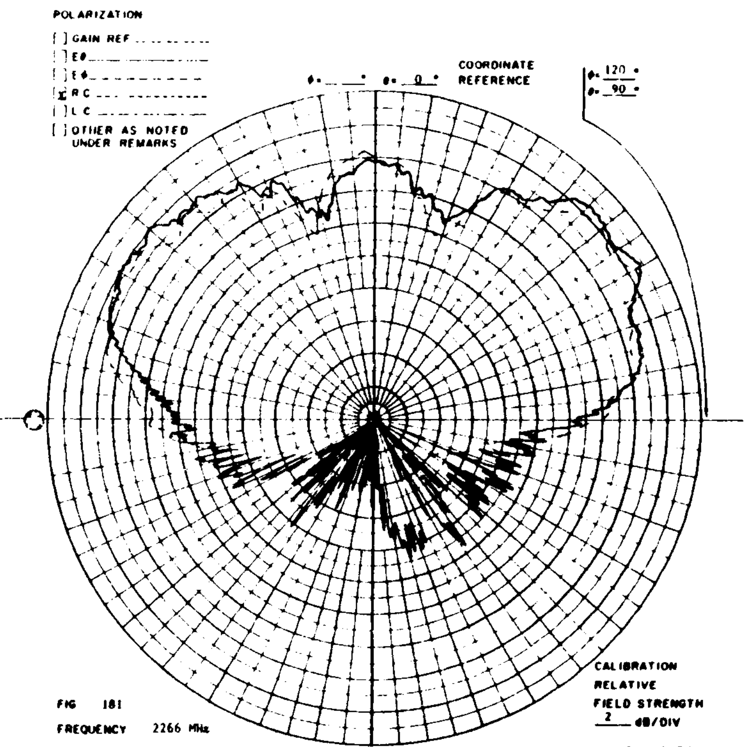

FIG 181
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 1
REMARKS Solar Array Removed
High Gain Antenna Removed
Cooler Door Open
160 Foot Range Leg - Solid Line
(3000 Foot Range Leg - Dashed Line)

PSL№ 141718

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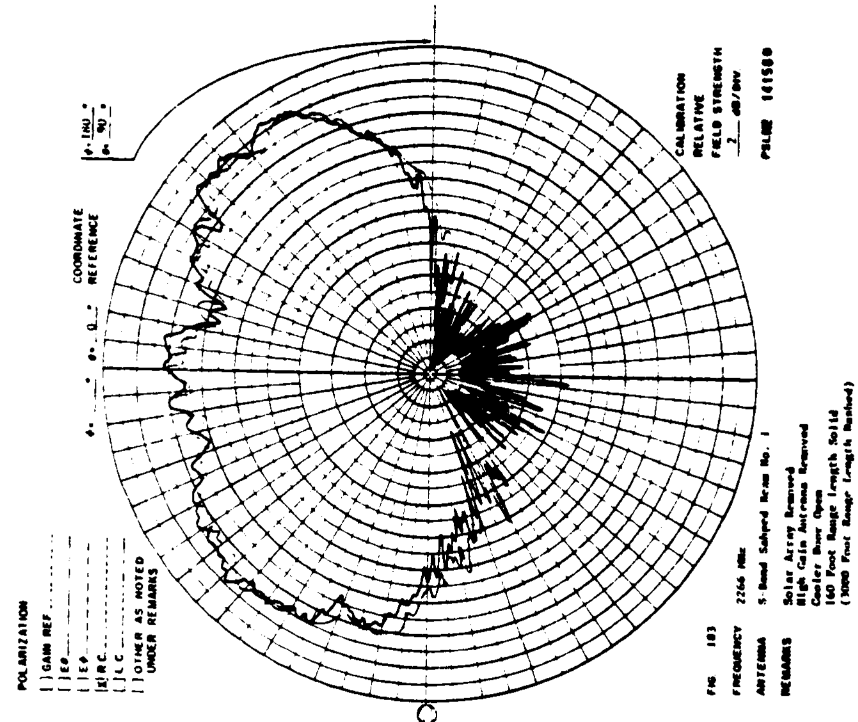

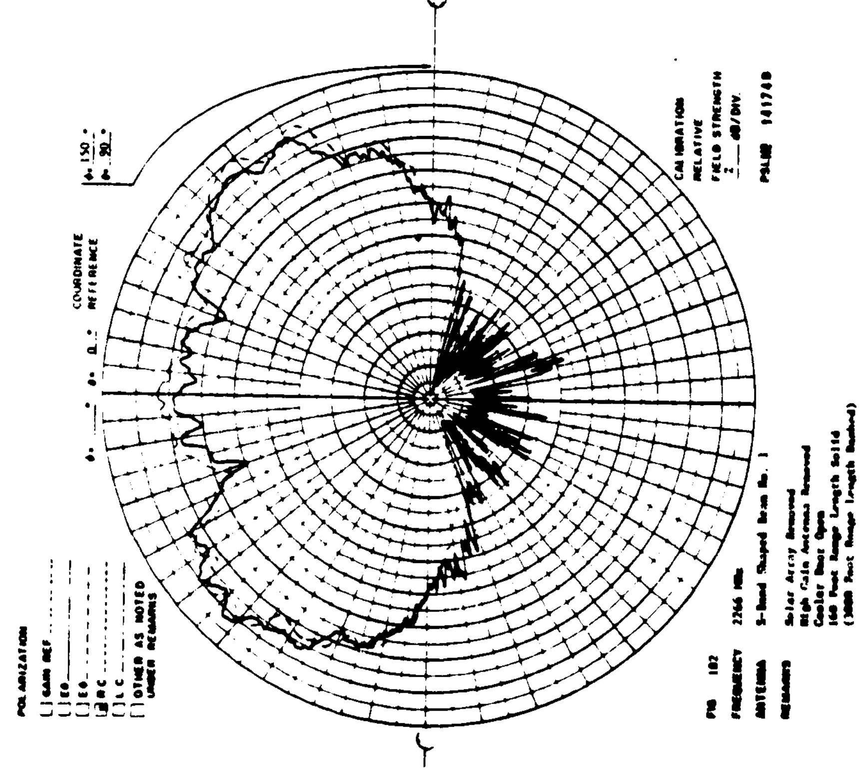

12.7 S-Band Shaped Beam No. 2 - Cooler Door Open
Antenna Patterns - 2266 MHz - Solar Array (-X)

12.7.1 R.C. Polarization
High-Gain Antenna (-Z)
Antenna Range Leg Length - 3,000 Feet

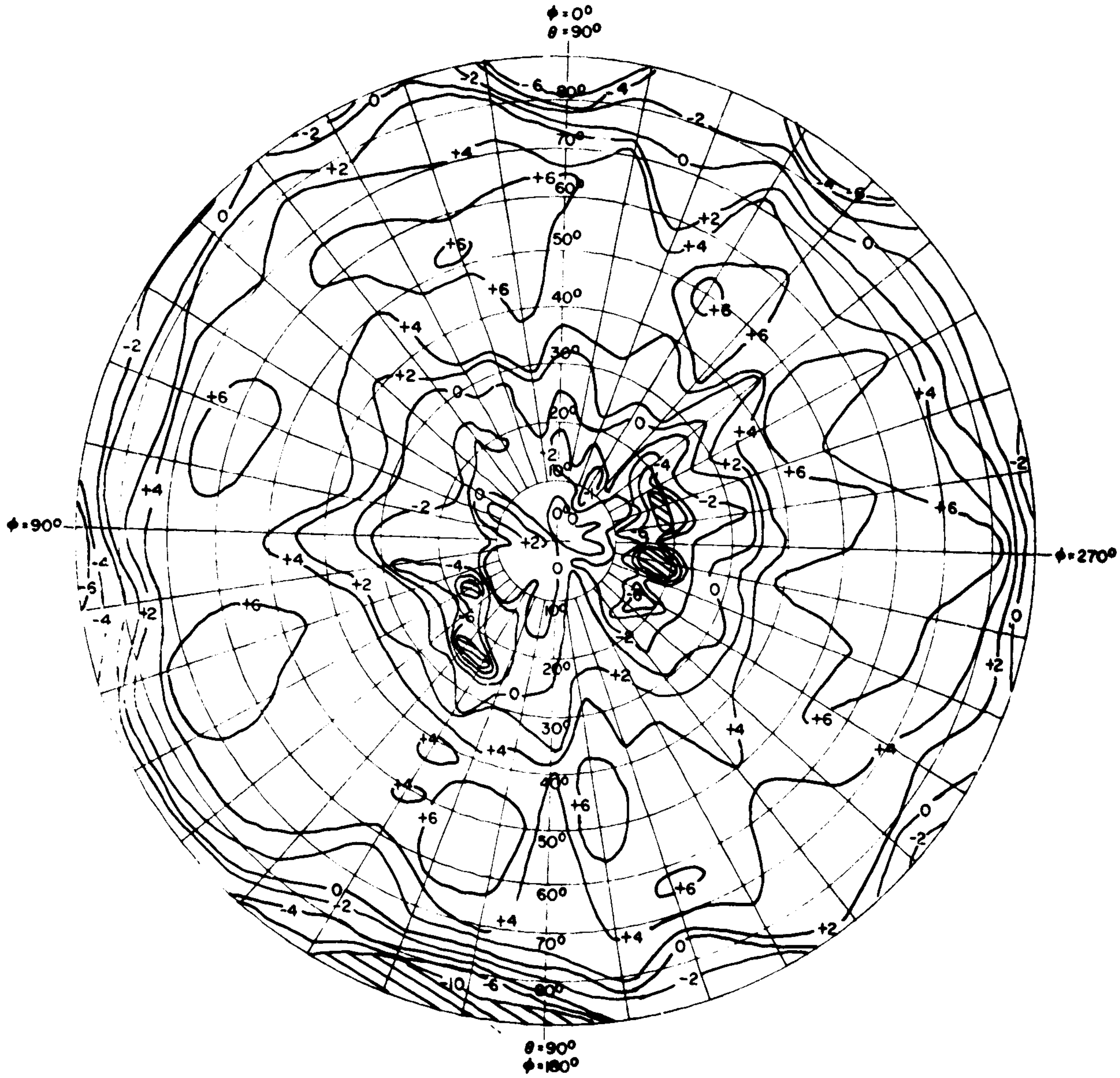

FIG. NO. 184 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT-D	POLARIZATION	R.C.
ANTENNA	S-Band Shaped Beam No. 2	GAIN REFERENCE	SGH-1.7 HORN
FREQUENCY	2266 MHz	ENGINEER	C.C. Post
MODEL SCALE	FULL		
REMARKS			
	SOLAR ARRAY (-X)		
	HIGH-GAIN ANTENNA (-Z)		

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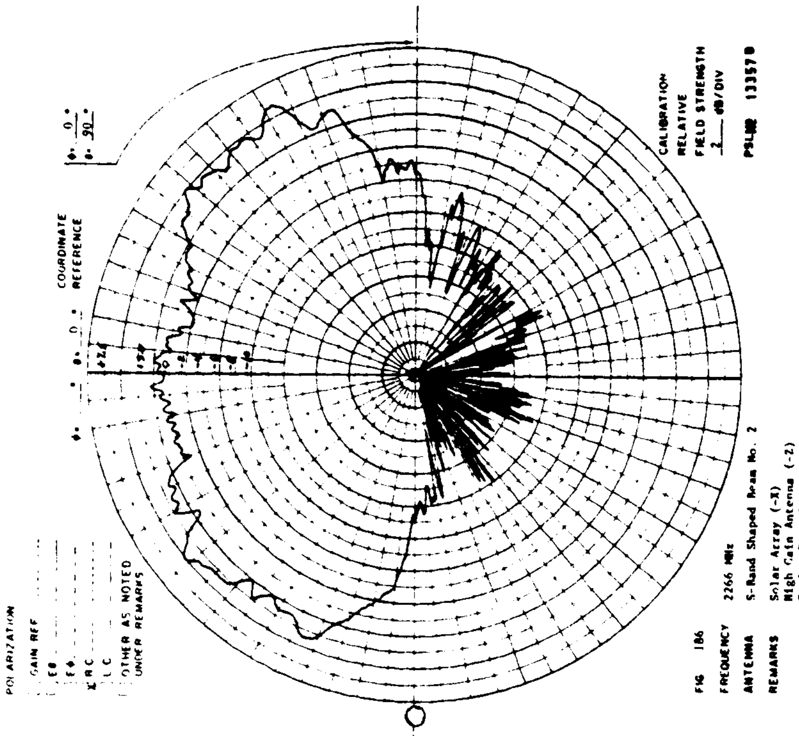

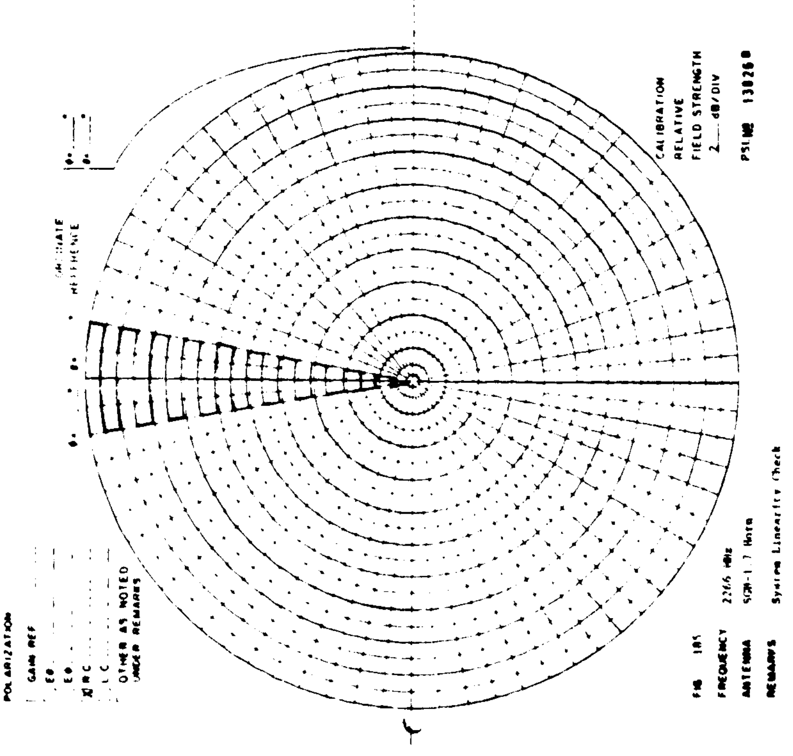

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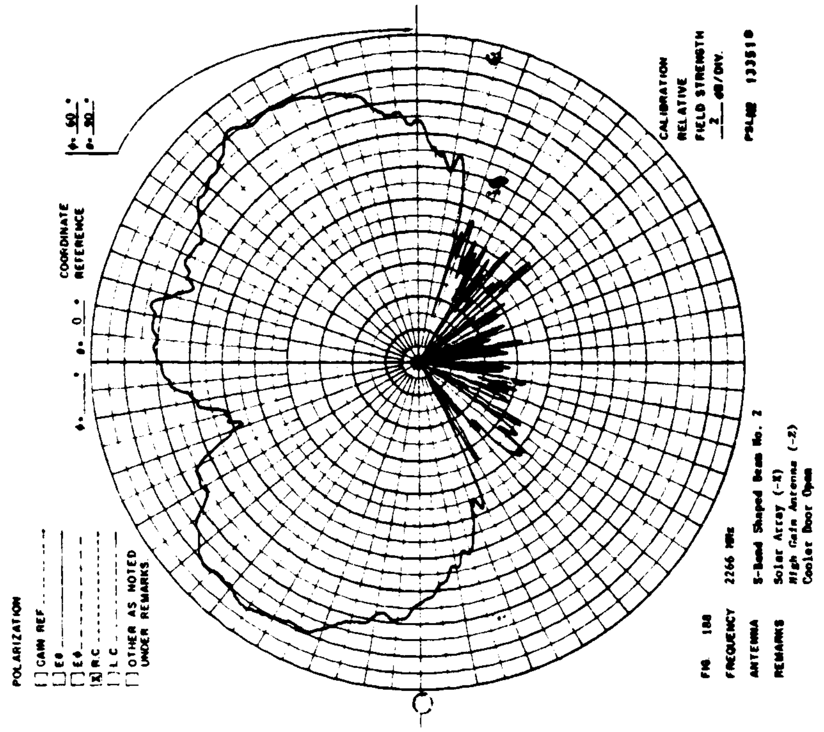

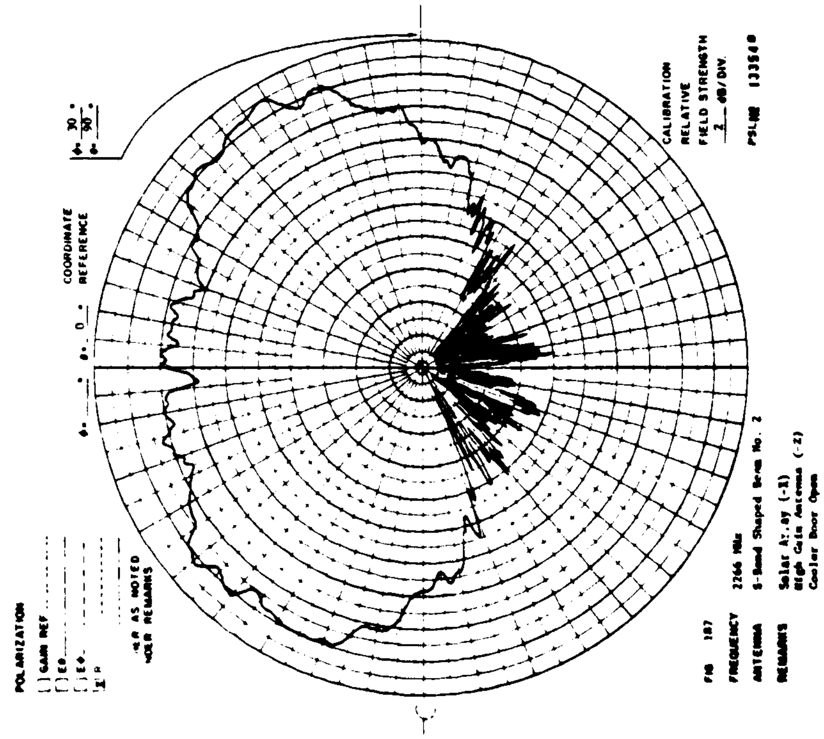

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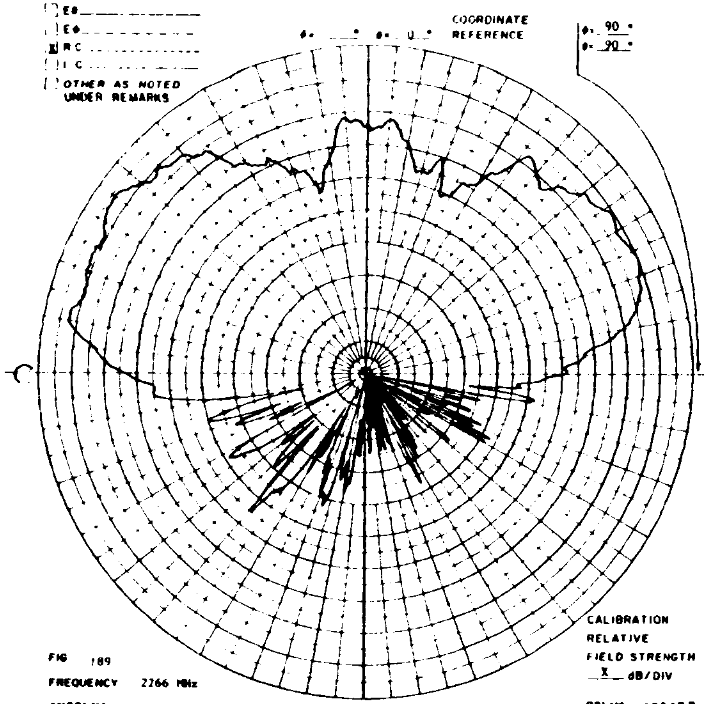
POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[X] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

COORDINATE REFERENCE θ = 90 °, φ = 90 °



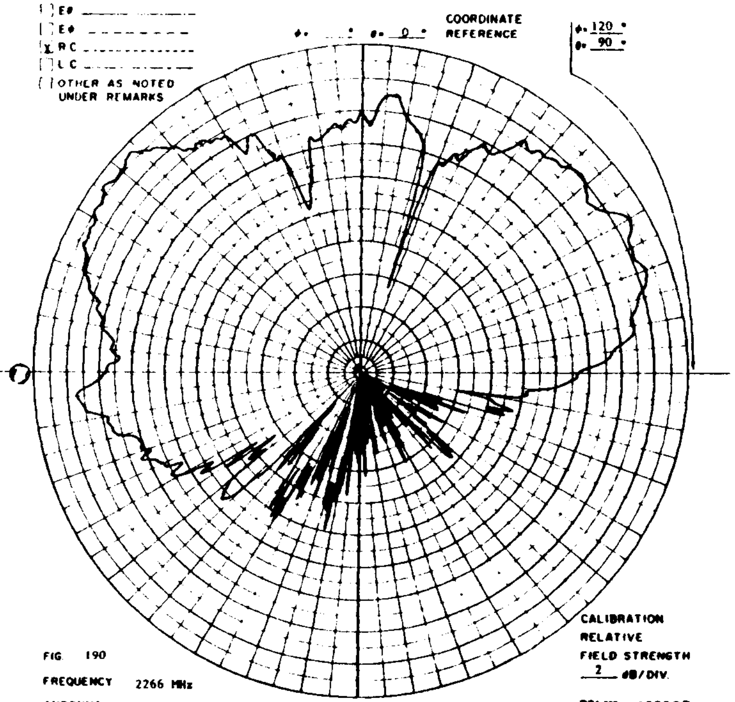
CALIBRATION
RELATIVE
FIELD STRENGTH
X dB/DIV

PSL№ 133478

FIG 189
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 2
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Open

POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[X] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

COORDINATE REFERENCE θ = 120 °, φ = 90 °



CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.

PSL№ 133608

FIG. 190
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 2
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Open

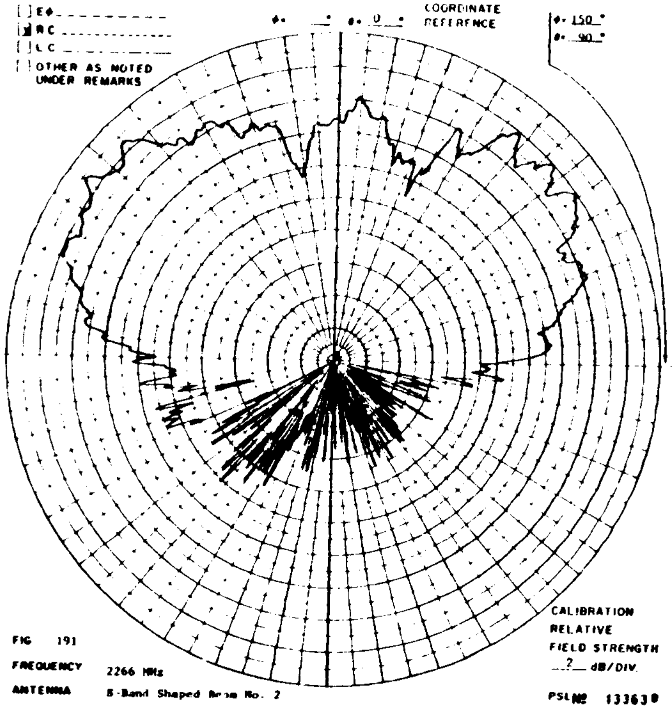


FIG 191
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 2
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Open

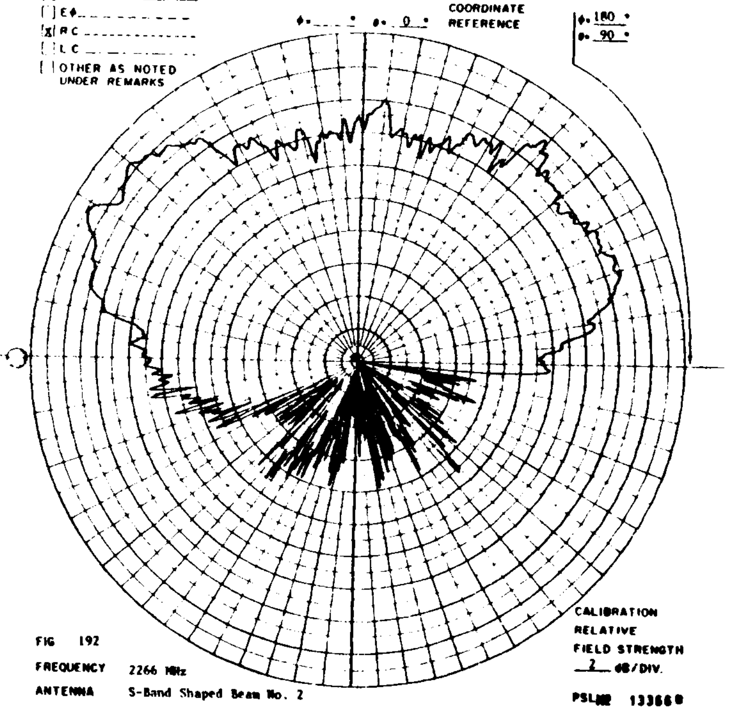


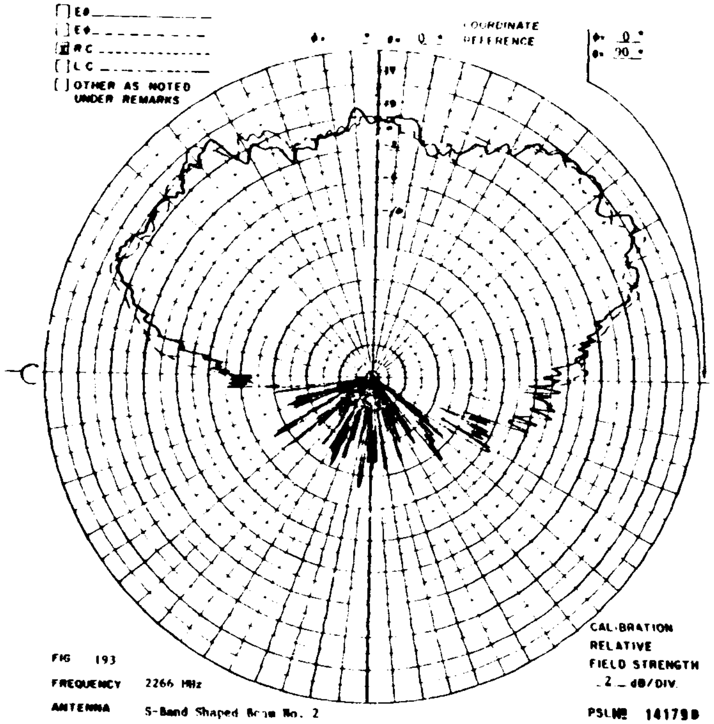
FIG 192
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 2
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Open

12.8 S-Band Shaped Beam No. 2 - Cooler Door Open
Special Test - 160 Foot Antenna Range - 2266 MHz
Solar Array and High-Gain Antennas Removed

12.8.1 As a special test full sets of data were measured for S-Band Shaped Beam Antenna No. 2 on the shorter, 160 foot, antenna range with both the High-Gain Antenna and the Solar Array removed. Power Contour plots were not made for these data. The dashed line data on Fig.'s 193 through 199 are data measured on the 3,000 foot antenna range with the Solar Array at (-X) and the High-Gain Antenna at (-Z).

POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[X] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

COORDINATE REFERENCE φ= 0° θ= 90°



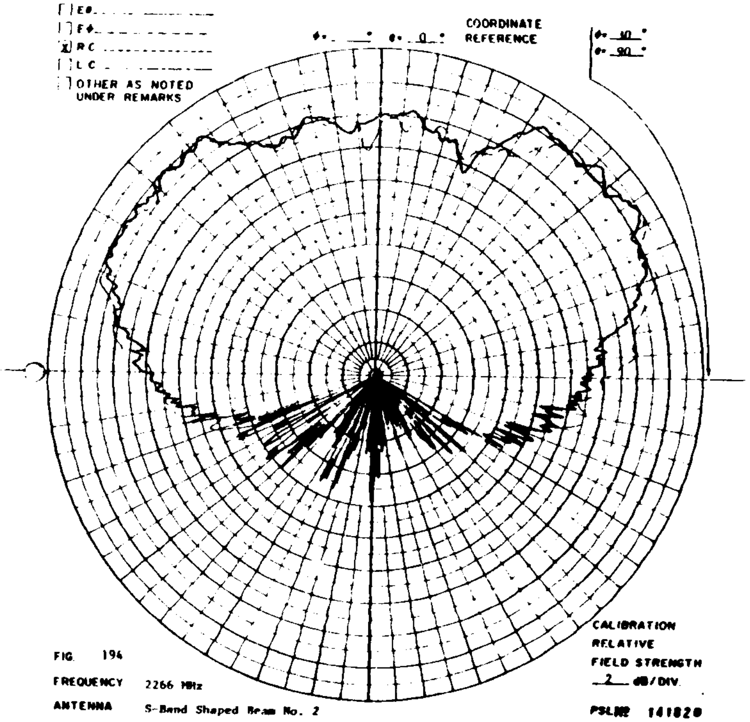
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.

PSL№ 141798

FIG 193
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 2
REMARKS Solar Array Removed
High Gain Antenna Removed
Cooler Door Open
160 Foot Range Length Solid Line
(3000 Foot Range Length Dashed Line)

POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[X] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

COORDINATE REFERENCE φ= 40° θ= 90°



CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.

PSL№ 141820

FIG. 194
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 2
REMARKS Solar Array Removed
High Gain Antenna Removed
Cooler Door Open
160 Foot Range Length Solid Line
(3000 Foot Range Length Dashed Line)

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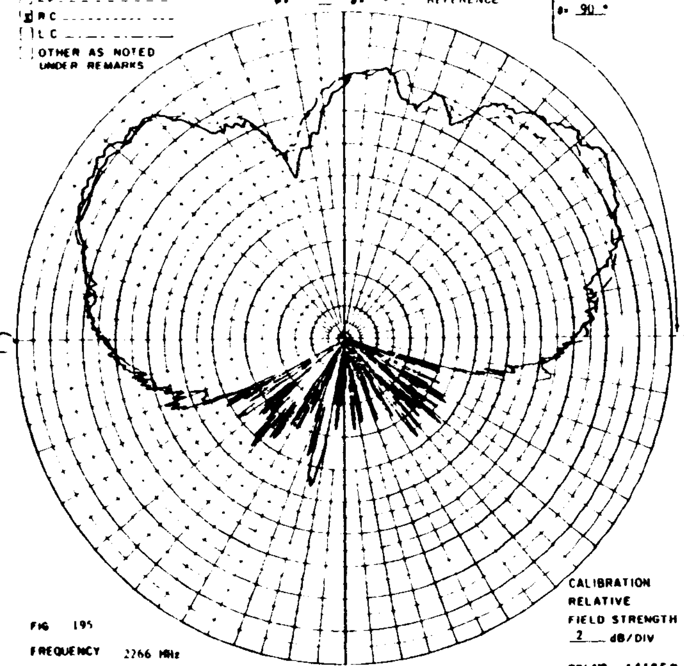
POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eϕ
[x] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

θ= ___° ϕ= 0° COORDINATE REFERENCE

ϕ= 60°
θ= 90°



CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV

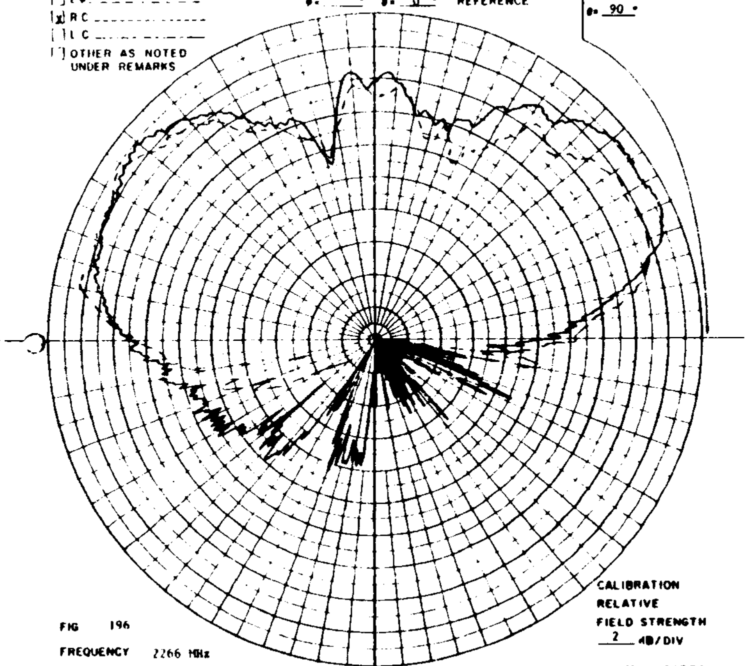
PSL№ 141858

FIG 195
FREQUENCY 2266 MHz
ANTENNA S Band Shaped Beam No. 2
REMARKS Solar Array Removed
High Gain Antenna Removed
Cooler Door Open
160 Foot Range Solid Line
(3000 Foot Range Dashed Line)

POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eϕ
[x] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

θ= ___° ϕ= 0° COORDINATE REFERENCE

ϕ= 90°
θ= 90°



CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV

PSL№ 141888

FIG 196
FREQUENCY 2266 MHz
ANTENNA S Band Shaped Beam No. 2
REMARKS Solar Array Removed
High Gain Antenna Removed
Cooler Door Open
160 Foot Range Length Solid Line
(3000 Foot Range Length Dashed Line)

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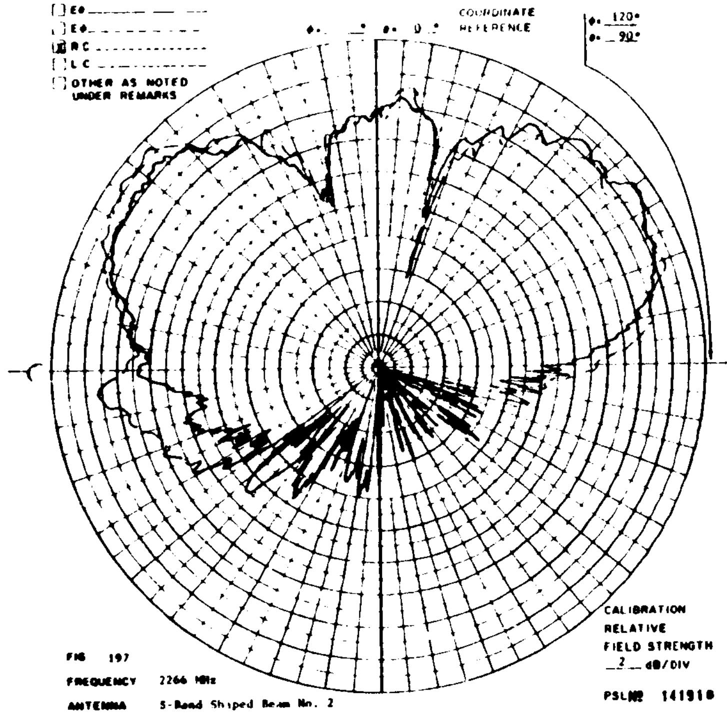

FIG 197
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 2
REMARKS Solar Array Removed
High Gain Antenna Removed
Cooler Door Open
160 Foot Range Length Solid Line
(3000 Foot Range Length Dashed Line)

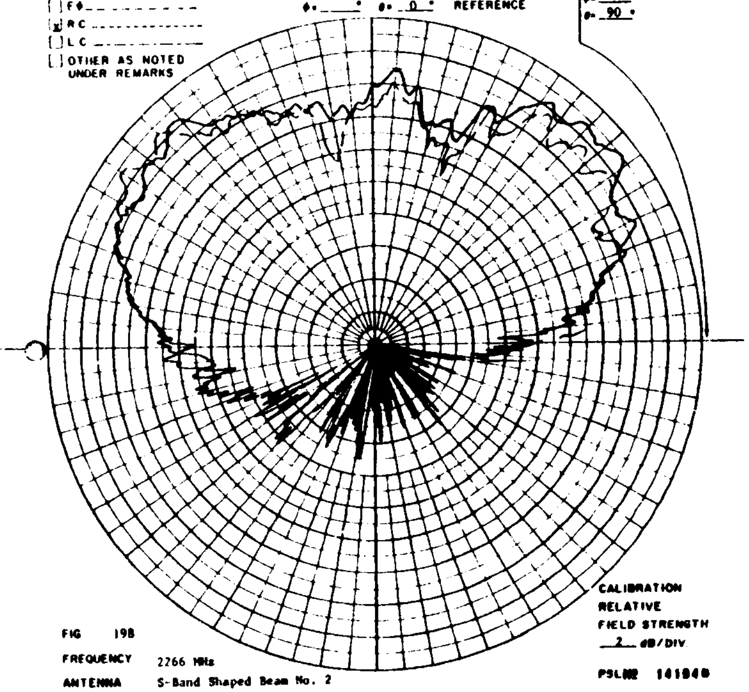

FIG 198
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 2
REMARKS Solar Array Removed
High Gain Antenna Removed
Cooler Door Open
160 Foot Range Length Solid Line
(3000 Foot Range Length Dashed Line)

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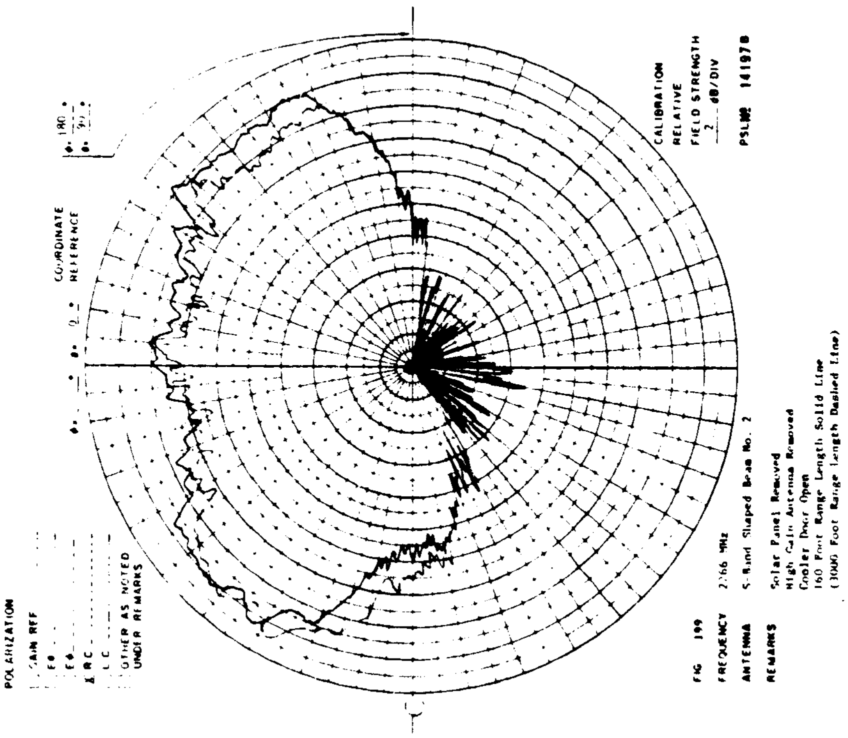

12.9 S-Band Shaped Beam Antenna No. 2 - Cooler Door Open Antenna Patterns - 2266 MHz - Solar Array (-Z)

12.9.1 R.C. Polarization

High-Gain Antenna (-Z)

Antenna Range Leg Length - 3000 Feet

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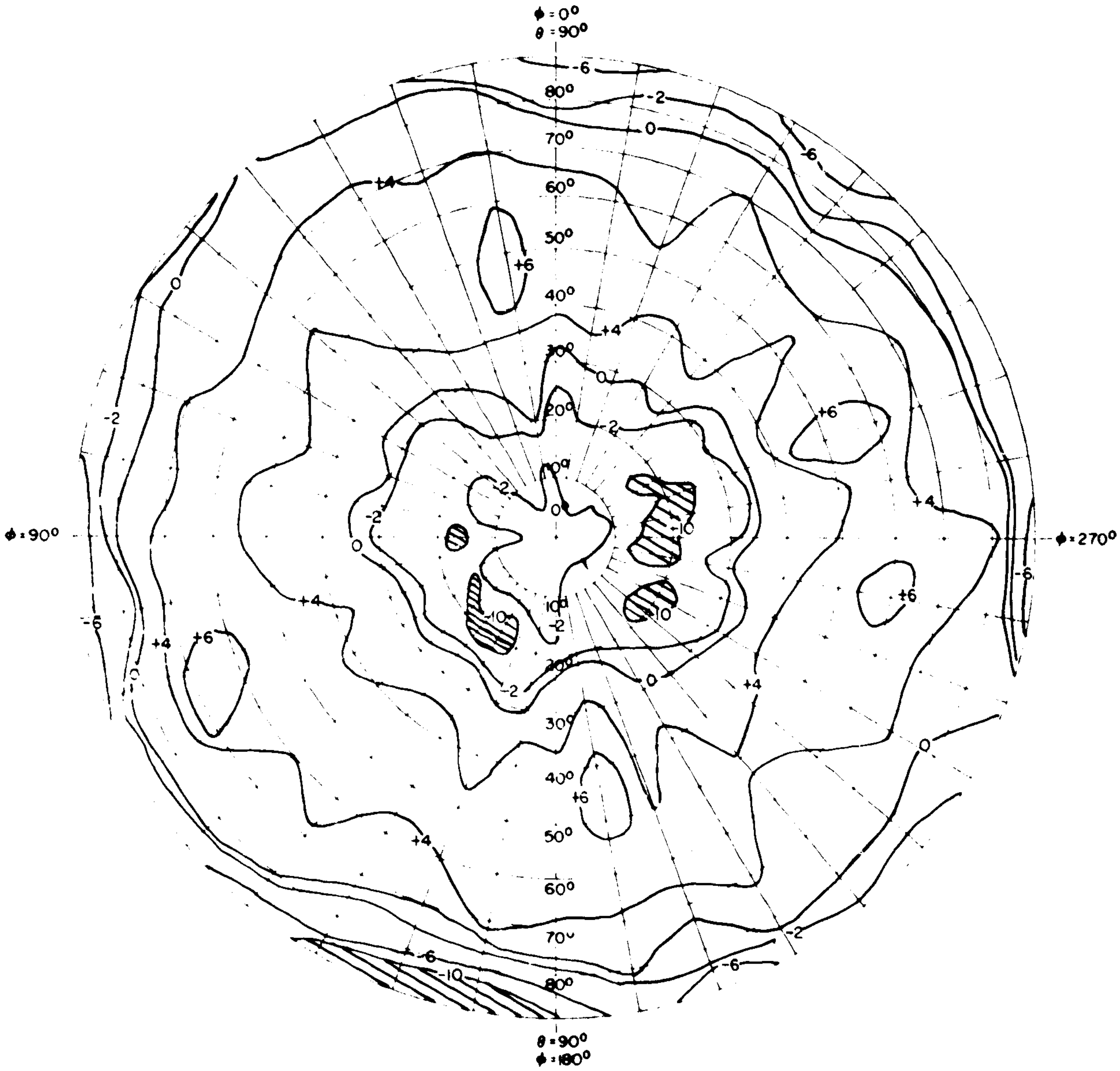

FIG. NO. [illegible] POWER CONTOUR GRAPH			
PROGRAM	LANDSAT D	POLARIZATION	R C
ANTENNA	S Band Shaped Beam No. 2	GAIN REFERENCE	SGH L 7 HORN
FREQUENCY	2266 MHz	ENGINEER	[illegible] Post
MODEL SCALE	Full		
REMARKS			
	SOLAR ARRAY [illegible]		
	High Gain Antenna [illegible]		
	Cooler Door Open		

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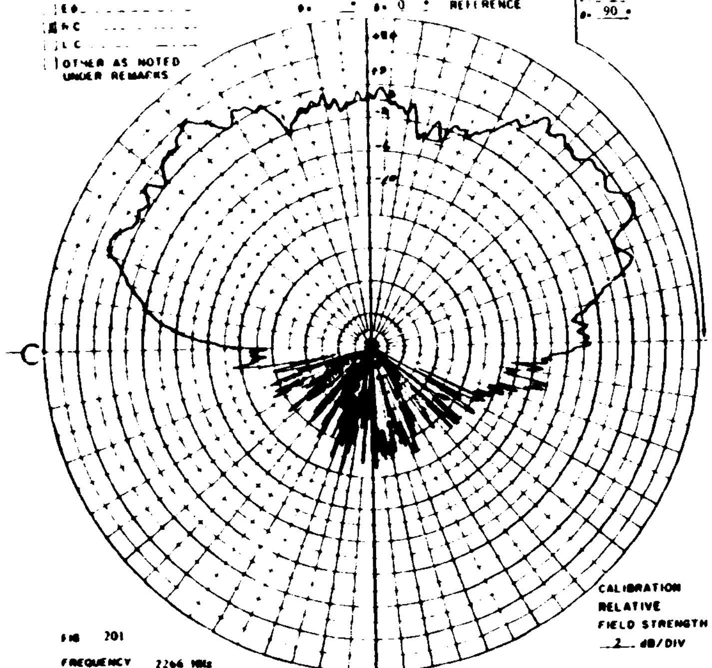
POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[X] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

COORDINATE REFERENCE
θ = 0°
φ = 90°



CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV

PSL NO 13388

FIG 201

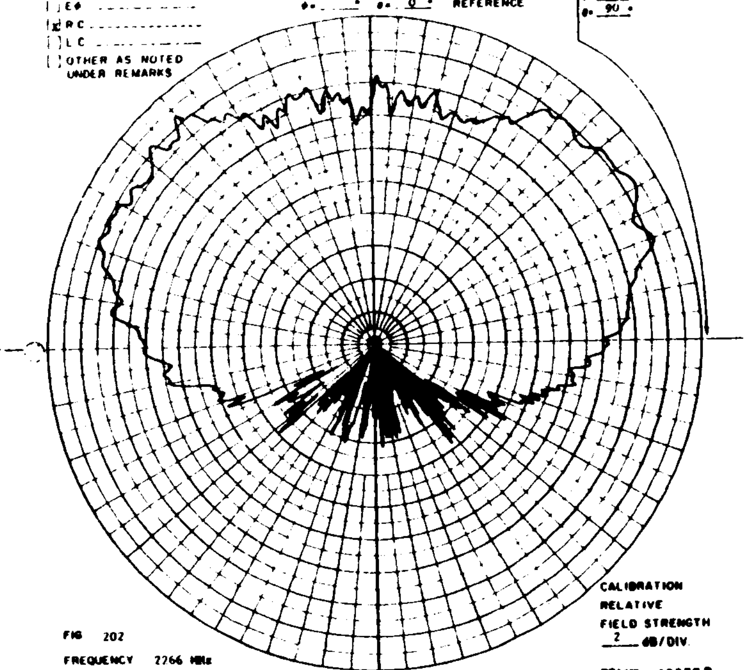
FREQUENCY 2266 MHz

ANTENNA S-Band Shaped Beam No. 2

REMARKS Solar Array (-Z)
High Gain Antenna (-Z)
Cooler Door Open

POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[X] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

COORDINATE REFERENCE
θ = 30°
φ = 90°



CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV

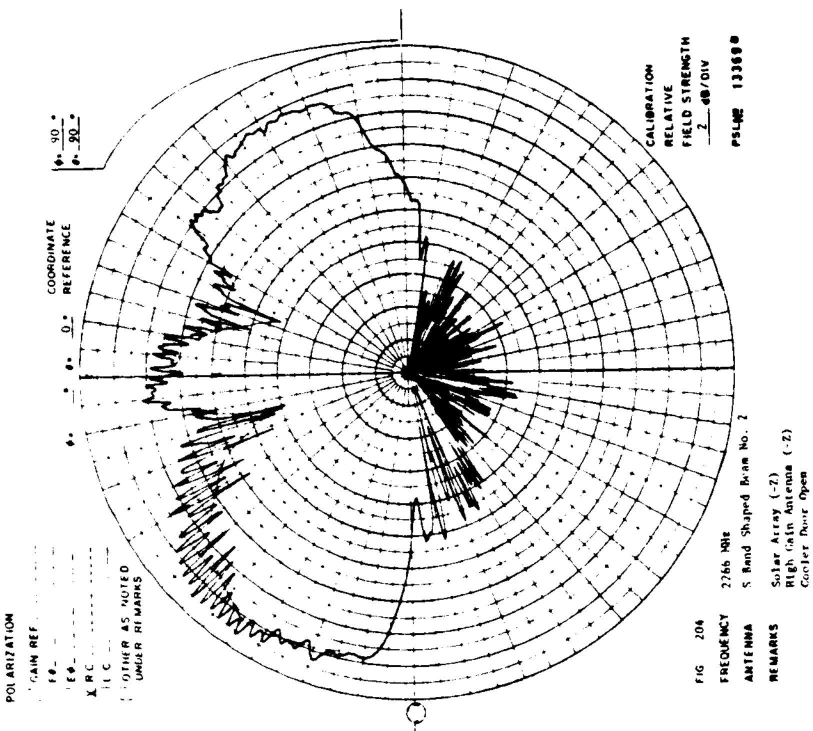
PSL NO 13375

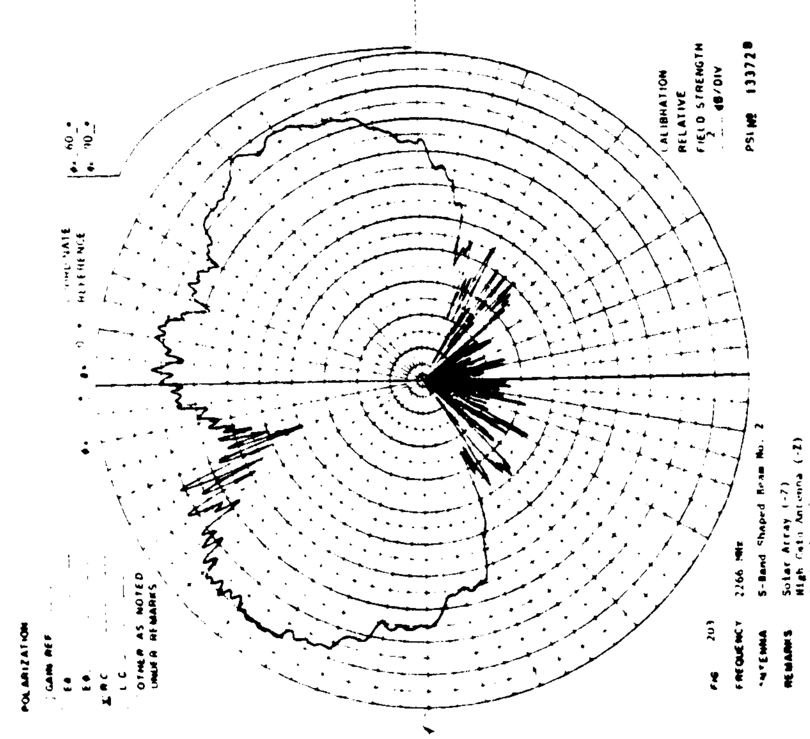
FIG 202

FREQUENCY 2266 MHz

ANTENNA S-Band Shaped Beam No. 2

REMARKS Solar Array (-Z)
High Gain Antenna (-Z)
Cooler Door Open


POLARIZATION
GAIN REF
OTHER AS NOTED
UNDER REMARKS
COORDINATE
REFERENCE
φ = 90°
θ = 90°
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
PSI № 133680
FIG 204
FREQUENCY 2266 MHz
S Band Shaped Beam No. 2
ANTENNA
Solar Array (-Z)
High Gain Antenna (-Z)
REMARKS
Cooler Door Open


POLARIZATION
GAIN REF
OTHER AS NOTED
UNDER REMARKS
REFERENCE
φ = 60°
θ = 90°
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
PSI № 133728
FIG 203
FREQUENCY 2266 MHz
S-Band Shaped Beam No. 2
ANTENNA
Solar Array (-Z)
High Gain Antenna (-Z)
REMARKS
Cooler Door Open

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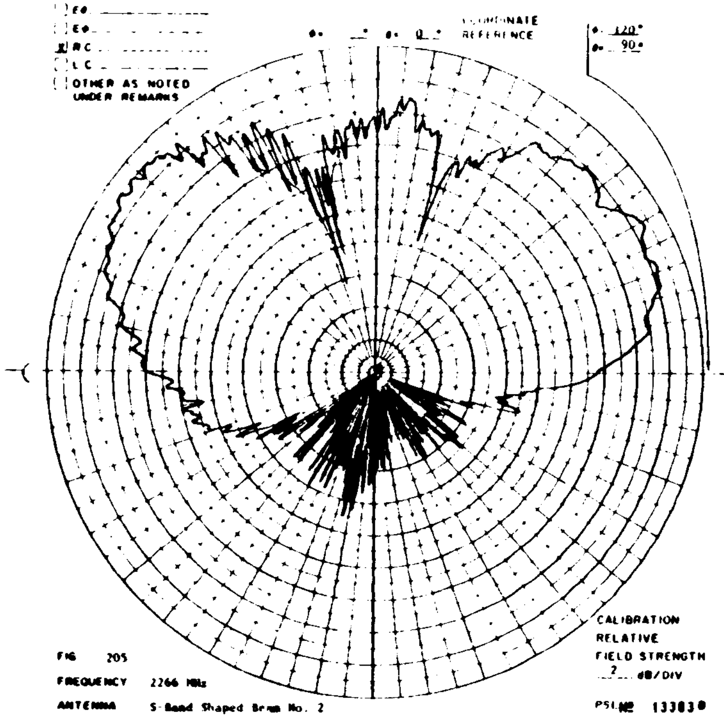

FIG 205
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 2
REMARKS Solar Array (-Z)
High Gain Antenna (-Z)
Cooler Door Open

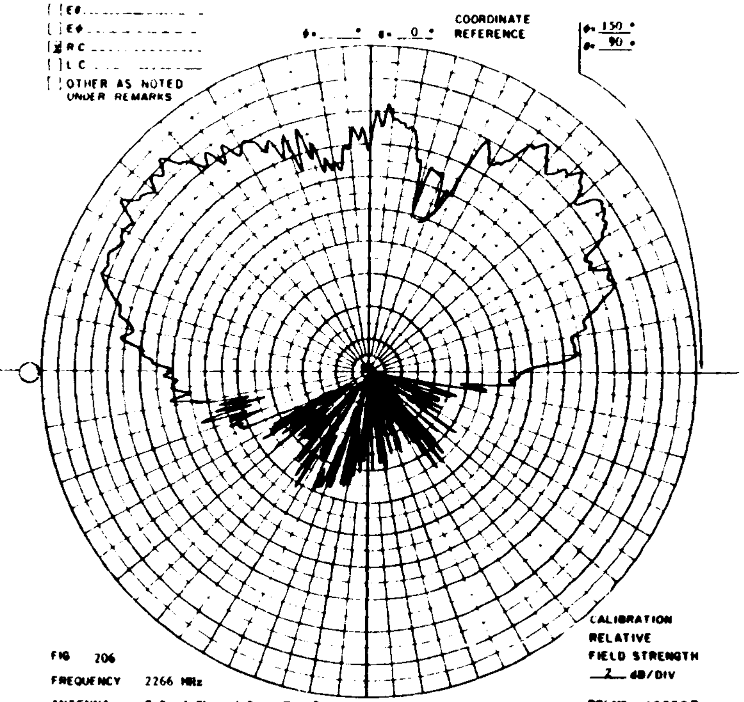

FIG 206
FREQUENCY 2266 MHz
ANTENNA S-Band Shaped Beam No. 2
REMARKS Solar Array (-Z)
High Gain Antenna (-Z)
Cooler Door Open

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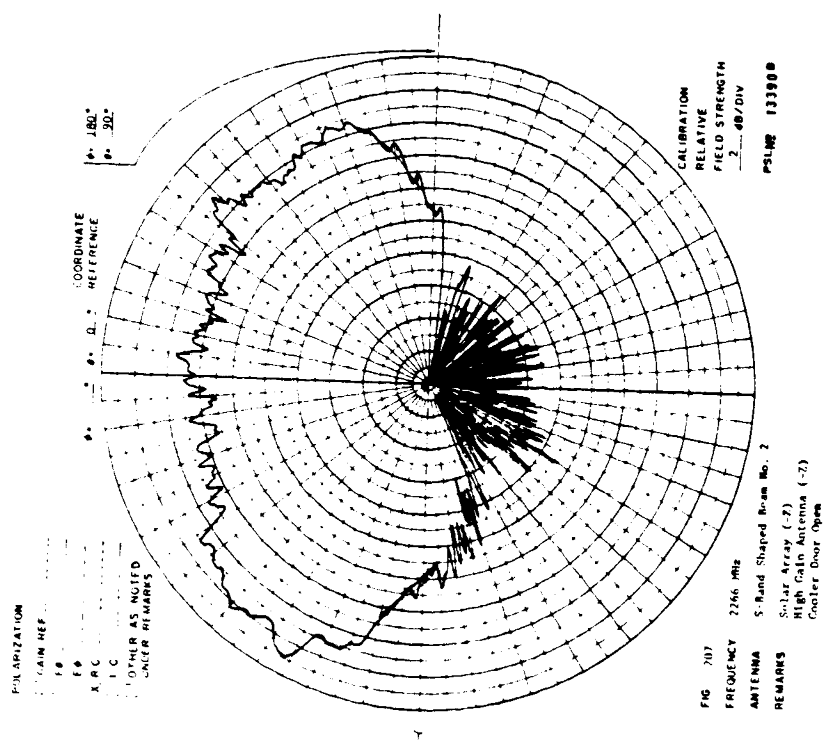

12.10 S-Band Omni Array - Port A - Antenna
Antenna Patterns - 2106 MHz - Solar Array (-X)

12.10.1 R.C. Polarization
High-Gain Antenna (-Z)
Antenna Range Leg Length - 3000 Feet

12.10.2 Survey data were measured with the cooler door closed. No effects of opening and closing the cooler door were observed.

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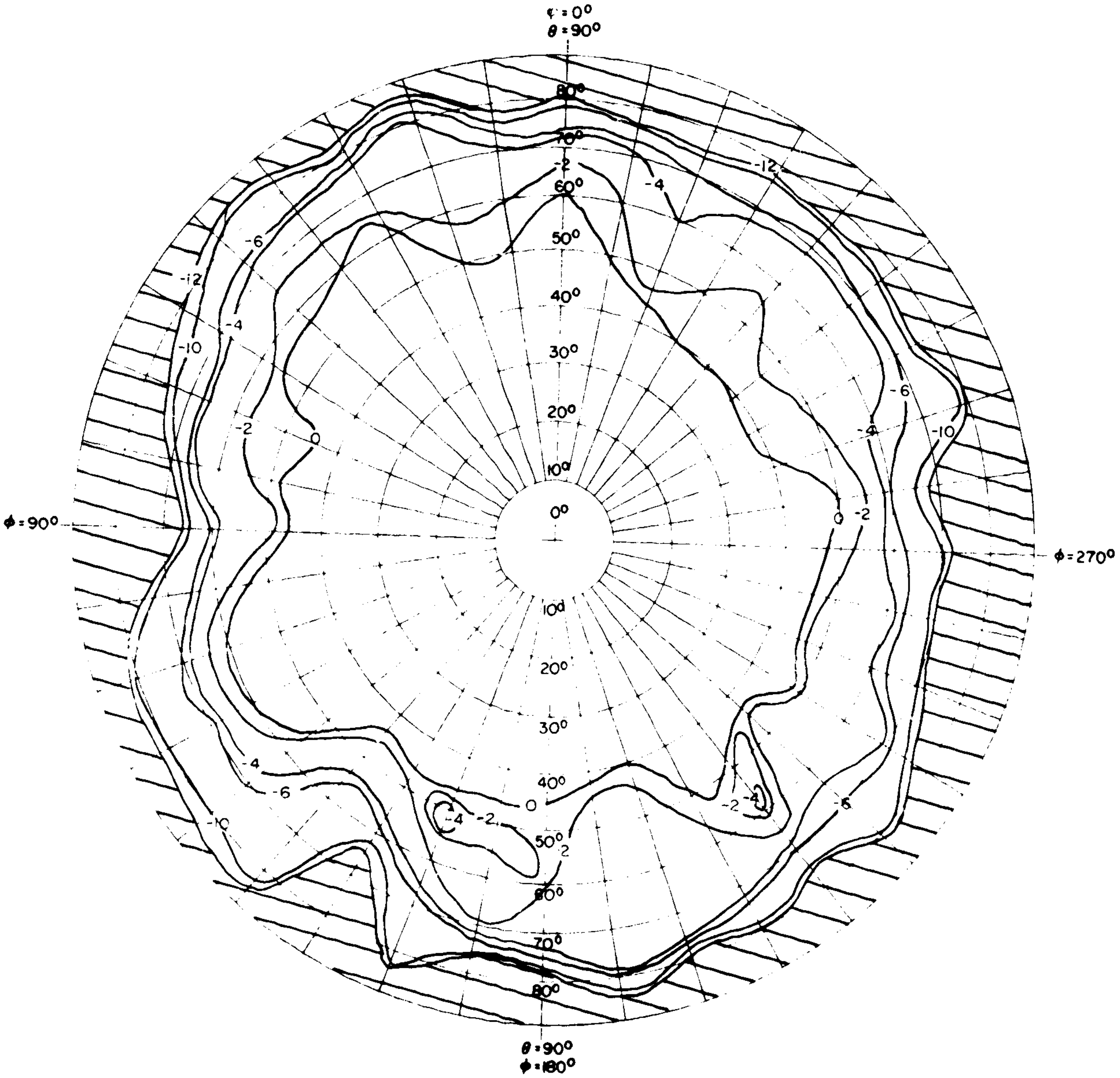

FIG. NO. 208 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT-D	POLARIZATION	R.C.
ANTENNA	S-Band Omni Array - Port A	GAIN REFERENCE	SGH-1.7 HORN
FREQUENCY	2106 MHz	ENGINEER	C.C. Post
MODEL SCALE	FULL		

REMARKS

SOLAR ARRAY (-X)

HIGH GAIN ANTENNA (-Z)

EARTH VIEW - COOLER DOOR OPEN

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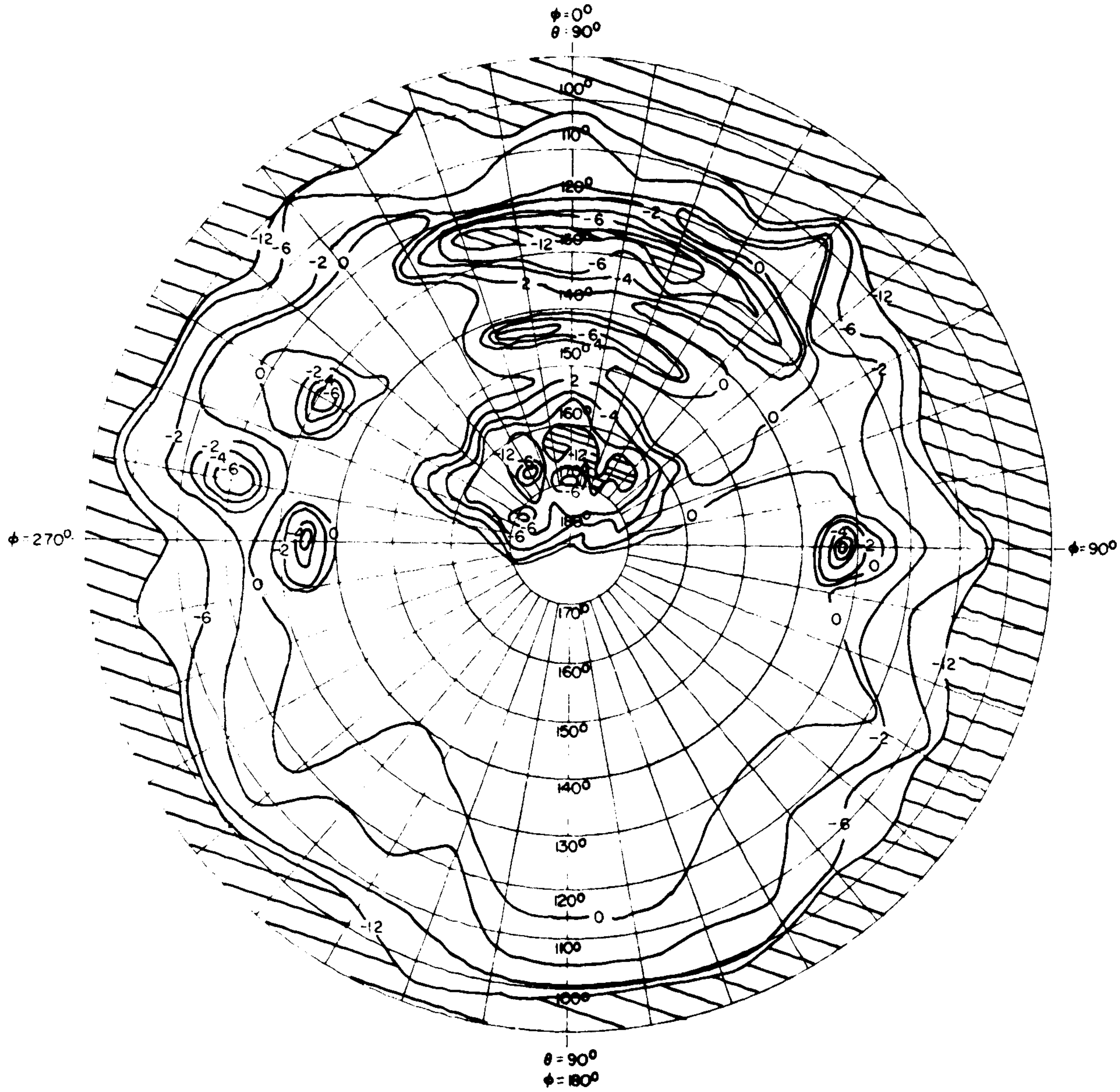

FIG. NO. 209 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT-D	POLARIZATION	R. C.
ANTENNA	S-Band Omni Array - Port A	GAIN REFERENCE	SGH-1.7 HORN
FREQUENCY	2106 MHz	ENGINEER	C. C. Post
MODEL SCALE	FULL		
REMARKS	SOLAR ARRAY (-X)		
	HIGH-GAIN ANTENNA (-Z)		
	SKY VIEW - COOLER DOOR OPEN		

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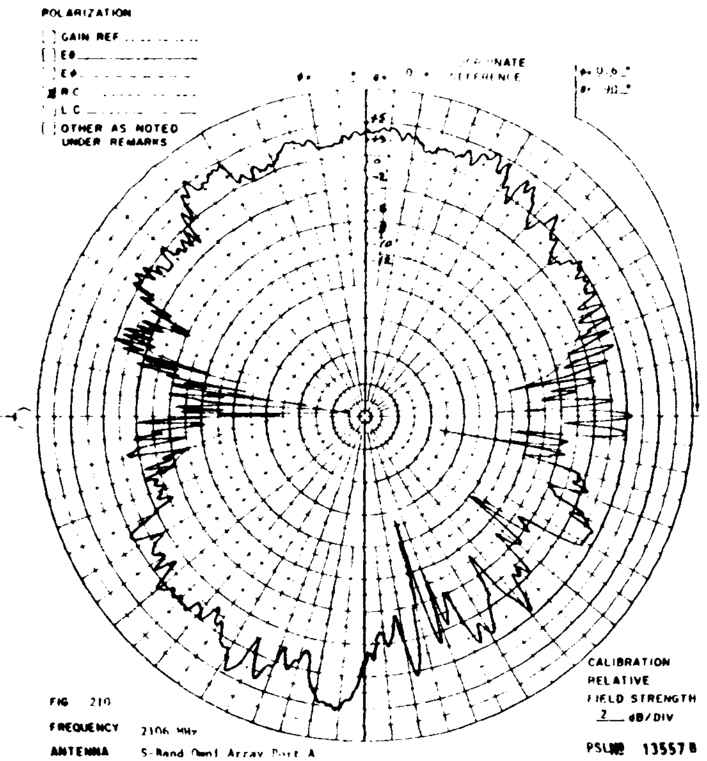

FIG 210
FREQUENCY 2106 MHz
ANTENNA S-Band Omni Array-Port A
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Open

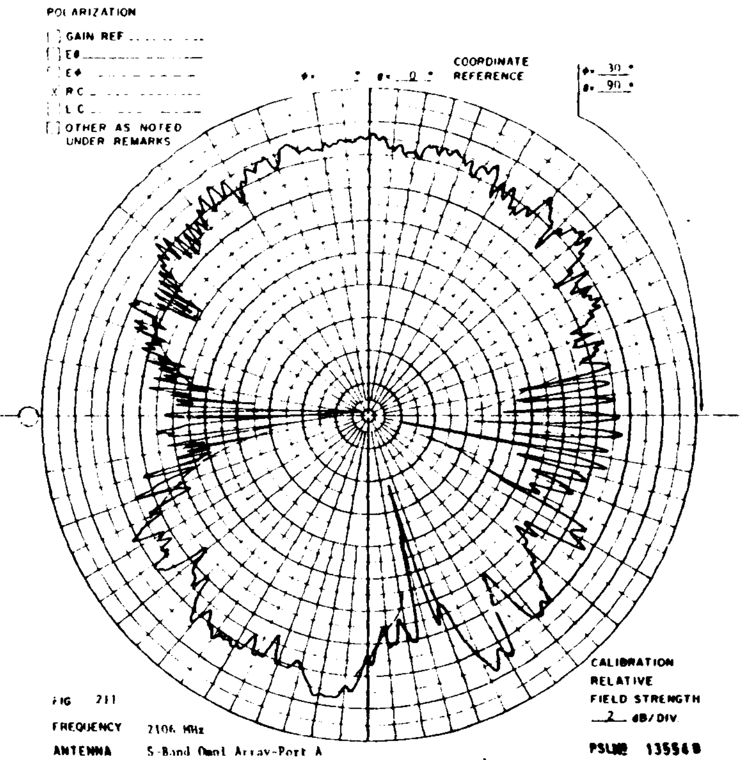

FIG 211
FREQUENCY 2106 MHz
ANTENNA S-Band Omni Array-Port A
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Open

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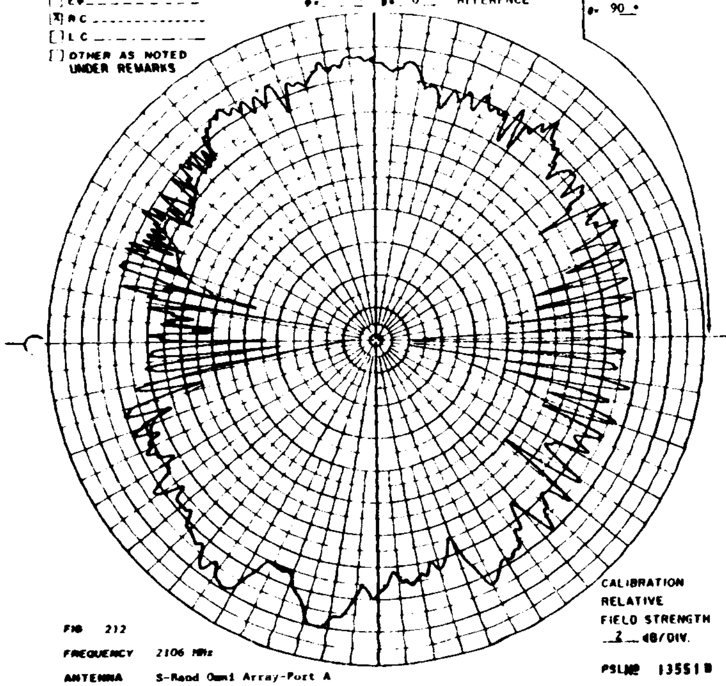
POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[X] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

φ= ___° θ= 0° COORDINATE REFERENCE

φ= 60° θ= 90°



CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.

PSL№ 13551B

FIG 212

FREQUENCY 2106 MHz

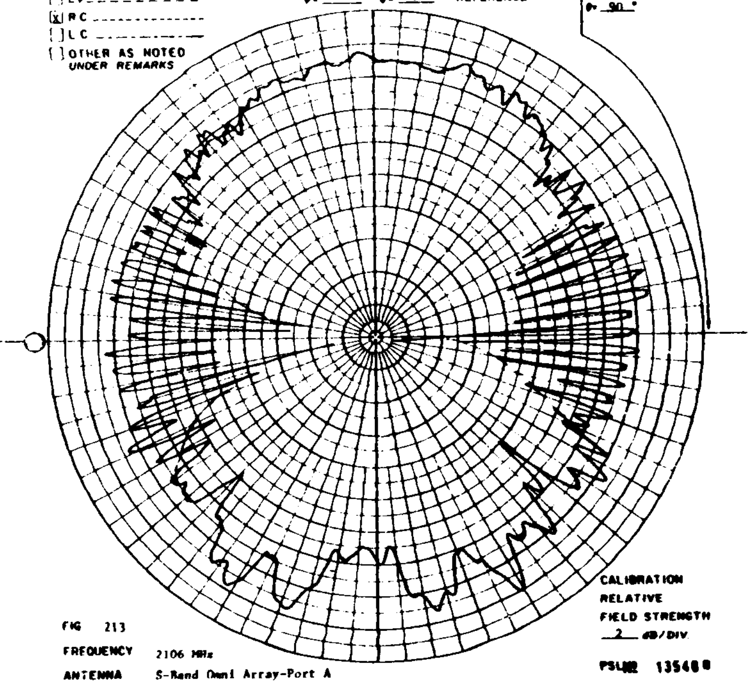
ANTENNA S-Band Omni Array-Port A

REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Open

POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[X] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

φ= ___° θ= 0° COORDINATE REFERENCE

φ= 90° θ= 90°



CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV

PSL№ 13548B

FIG 213

FREQUENCY 2106 MHz

ANTENNA S-Band Omni Array-Port A

REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Open

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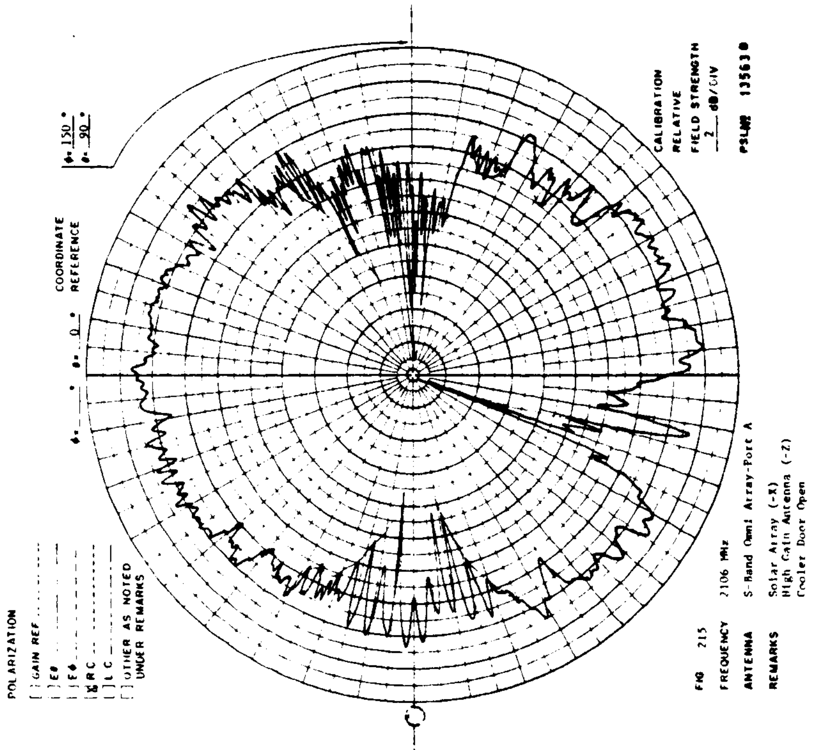

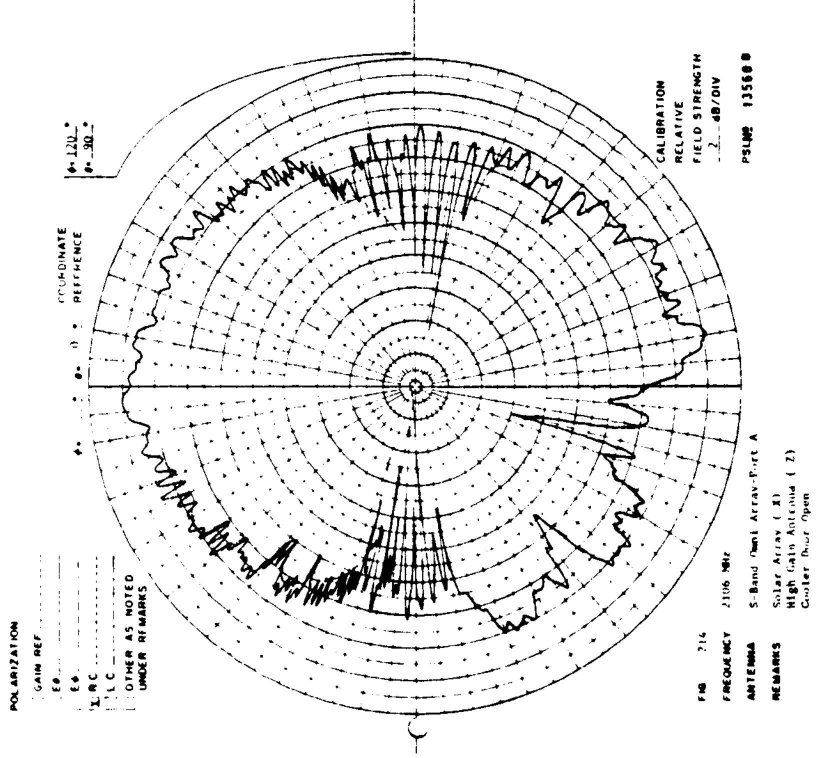

12.11 S-Band Omni Array - Port A - Antenna Antenna Patterns - 2106 MHz - Solar Array (-Z)

12.11.1 R.C. Polarization
High-Gain Antenna (-Z)
Antenna Range Leg Length - 3000 Feet

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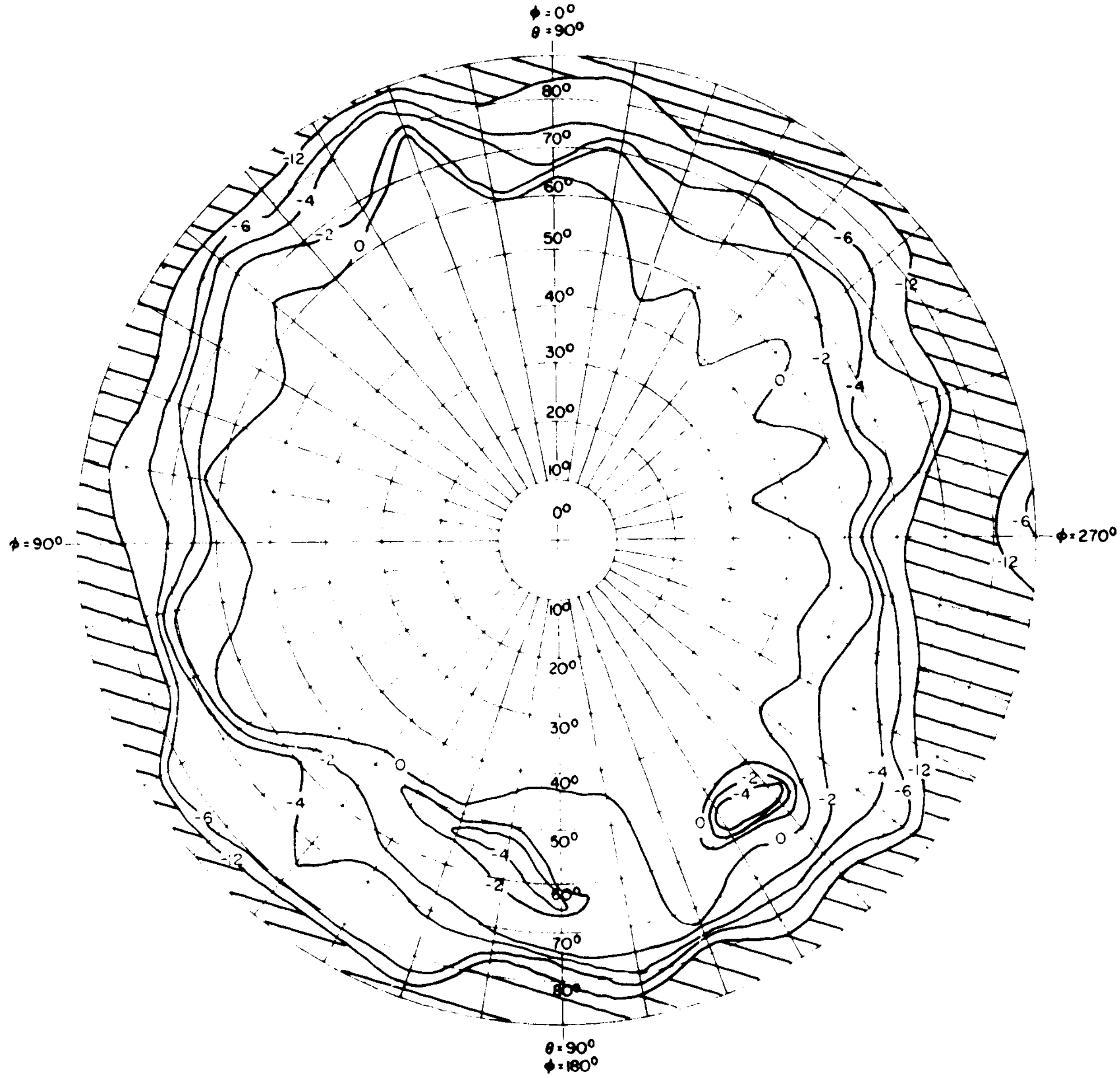


FIG. NO. 216 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT D	POLARIZATION	R C
ANTENNA	S Band Omni Array Port A	GAIN REFERENCE	SGH [illegible] HORN
FREQUENCY	2106 MHz	ENGINEER	[illegible] Post
MODEL SCALE	Full		

REMARKS
Solar Array [illegible]
High Gain Antenna [illegible]
Cooler Door Open

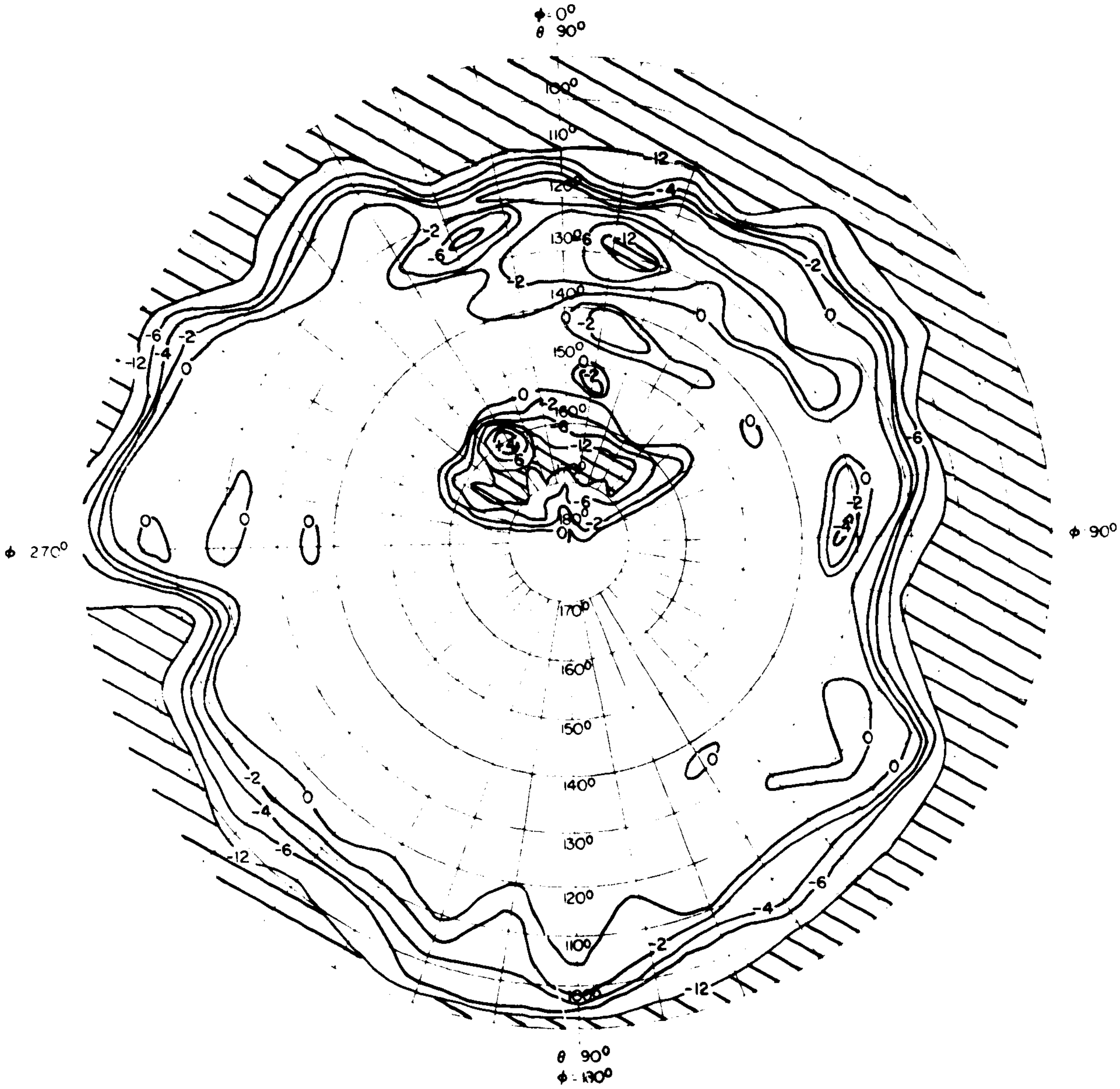
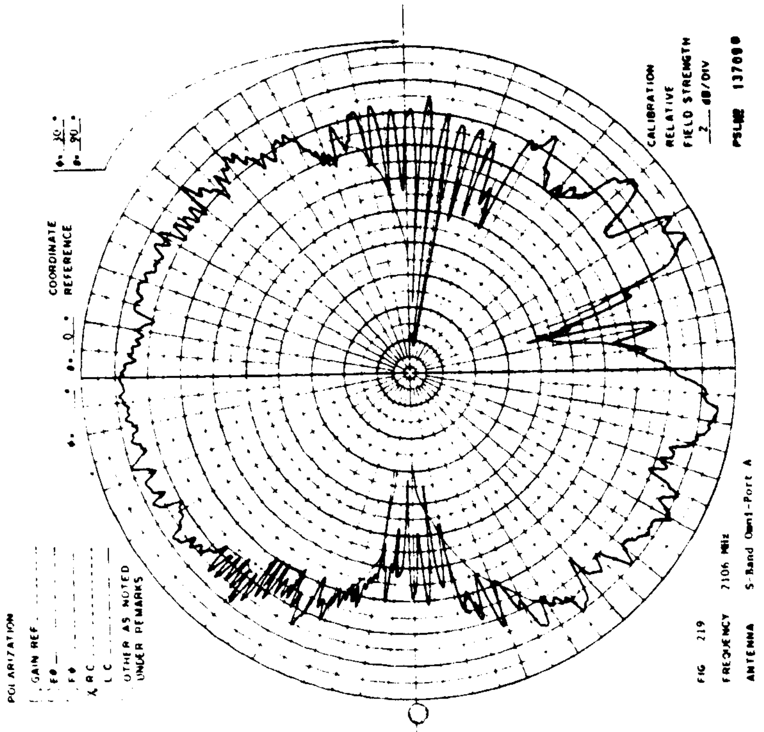
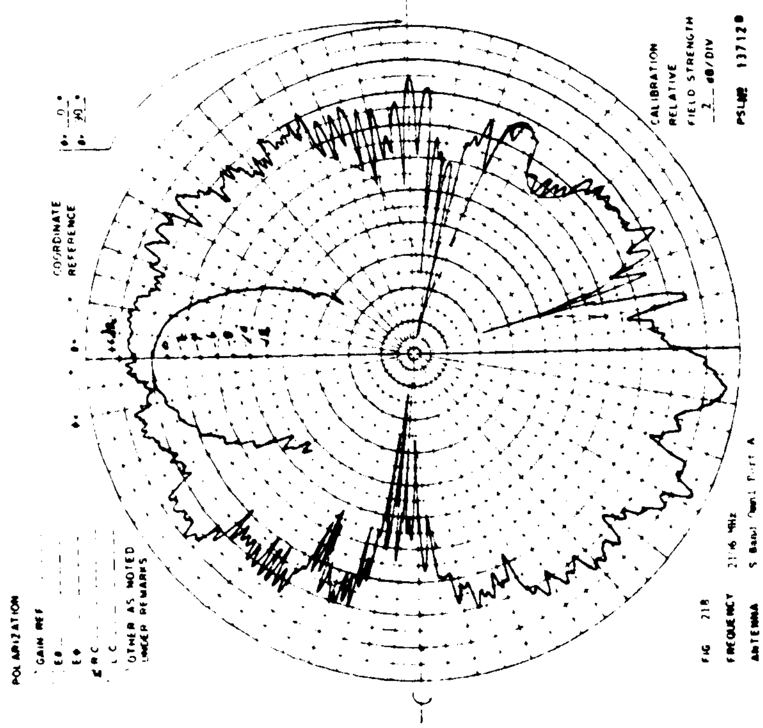


FIG. NO. 217 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT-D	POLARIZATION	R.C.
ANTENNA	S Band Omni Array - Port A	GAIN REFERENCE	SGH 1.7 HORN
FREQUENCY	2106 MHz	ENGINEER	C.C. Post
MODEL SCALE	FULL		
REMARKS			
	SOLAR ARRAY (-Z)		
	HIGH GAIN ANTENNA (-Z)		
	COOLER DOOR OPEN		


POLARIZATION
GAIN REF.
OTHER AS NOTED
UNDER REMARKS
COORDINATE
REFERENCE
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
FIG 219
FREQUENCY 2106 MHz
ANTENNA S-Band Omni-Port A
REMARKS Solar Array (-Z)
High Gain (-Z)


POLARIZATION
GAIN REF
OTHER AS NOTED
UNDER REMARKS
COORDINATE
REFERENCE
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
FIG 218
FREQUENCY 2106 MHz
ANTENNA S-Band Omni-Port A
REMARKS Solar Array (-Z)
High Gain (-Z)

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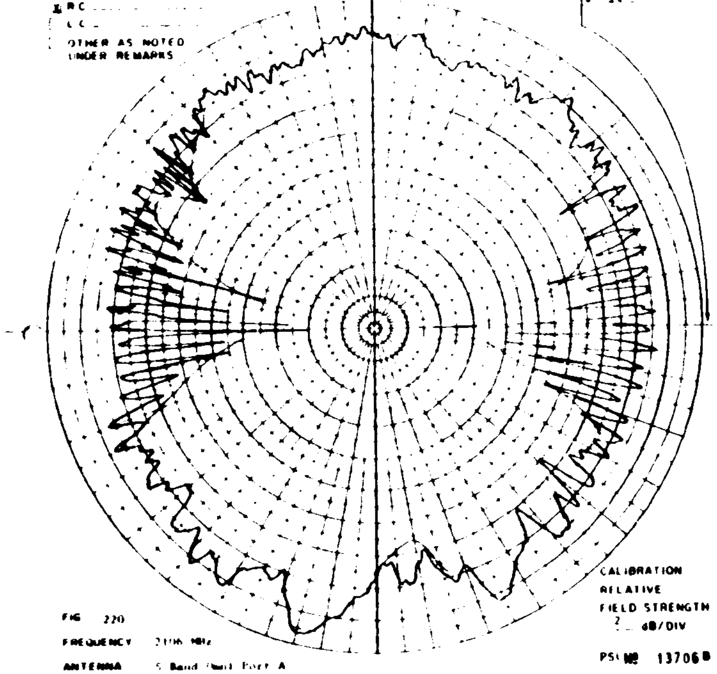
POLARIZATION
GAIN REF
Eθ
Eφ
X RC
LC
OTHER AS NOTED
UNDER REMARKS

φ = 0 ° COORDINATE REFERENCE

θ = 60 °
φ = 90 °



CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV

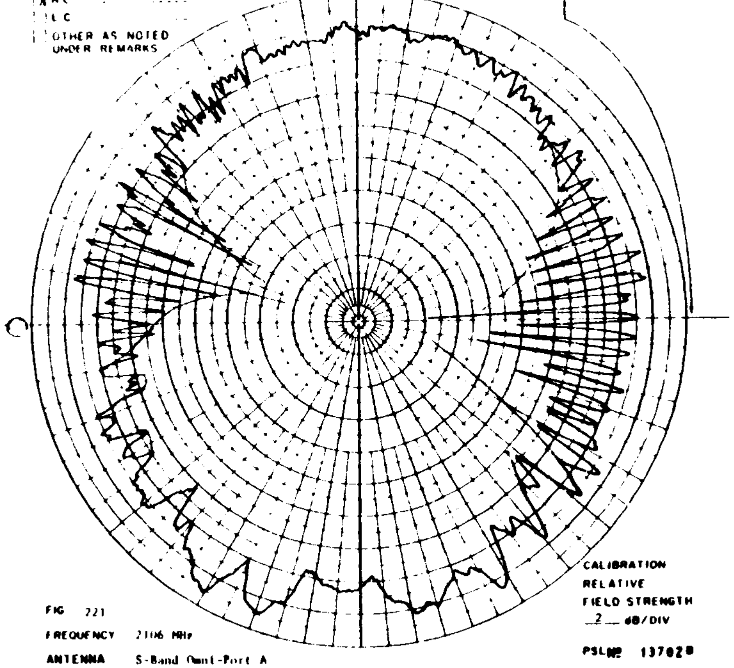
PSL№ 13706B

FIG 220
FREQUENCY 2106 MHz
ANTENNA S-Band Omni-Port A
REMARKS Solar Array (-Z)
High Gain (-Z)

POLARIZATION
GAIN REF
Eθ
Eφ
X RC
LC
OTHER AS NOTED
UNDER REMARKS

φ = 0 ° COORDINATE REFERENCE

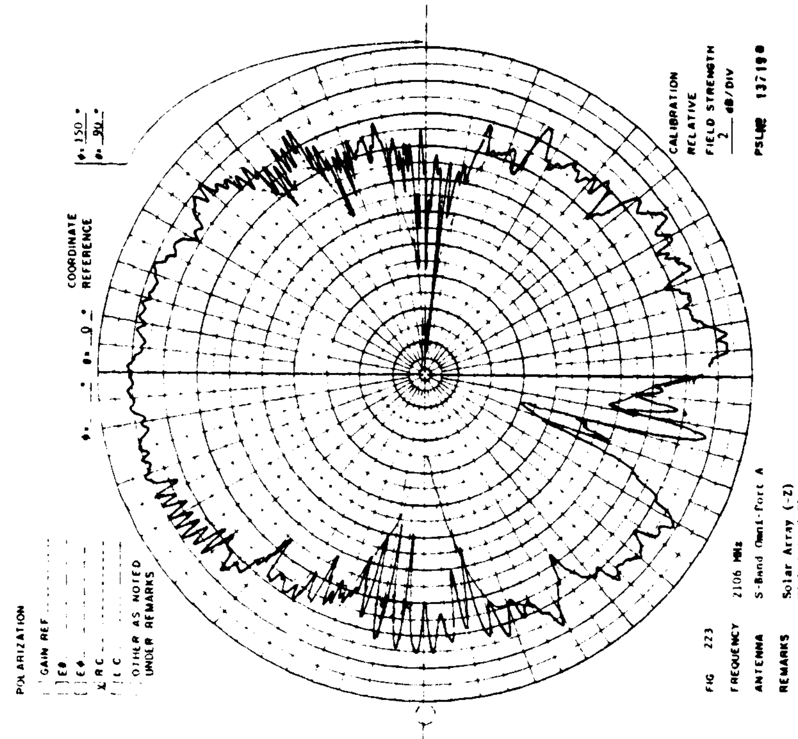
θ = 90 °
φ = 90 °

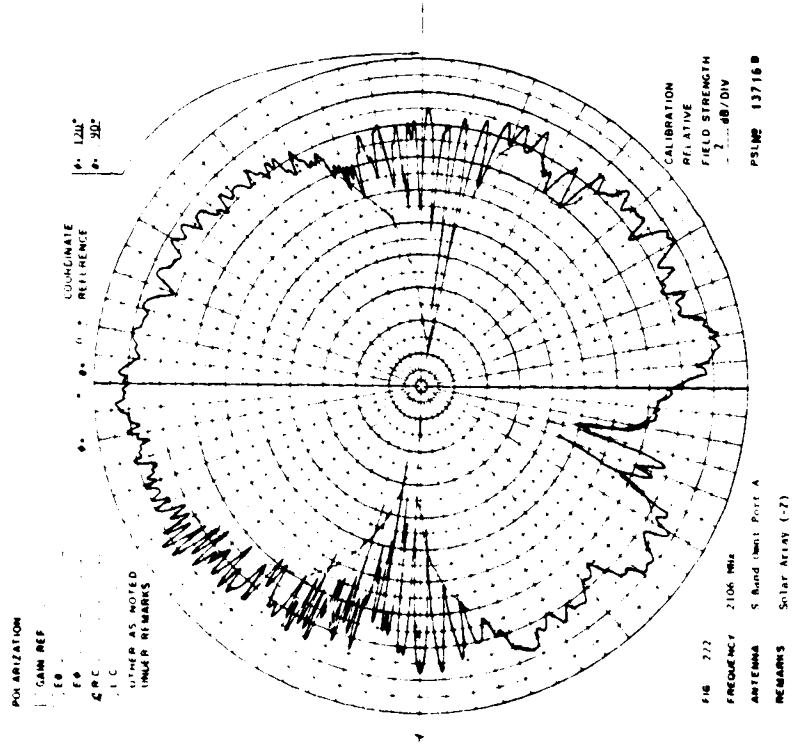


CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV

PSL№ 13702B

FIG 221
FREQUENCY 2106 MHz
ANTENNA S-Band Omni-Port A
REMARKS Solar Array (-Z)
High Gain (-Z)


POLARIZATION
GAIN REF
OTHER AS NOTED UNDER REMARKS
COORDINATE REFERENCE
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
FIG 223
FREQUENCY 2106 MHz
ANTENNA S-Band Omni-Port A
REMARKS Solar Array (-Z) High Gain (-Z)


POLARIZATION
GAIN REF
OTHER AS NOTED UNDER REMARKS
COORDINATE REFERENCE
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
FIG 222
FREQUENCY 2106 MHz
ANTENNA S-Band Omni Port A
REMARKS Solar Array (-Z) High Gain (-Z)

12.12 S-Band Omni Array - Port A - Antenna
Antenna Patterns - 2287.5 MHz - Solar Array (-X)

12.12.1 R.C. Polarization
High-Gain Antenna (-Z)
Cooler Door Open
Antenna Range Leg Length - 3000 Feet

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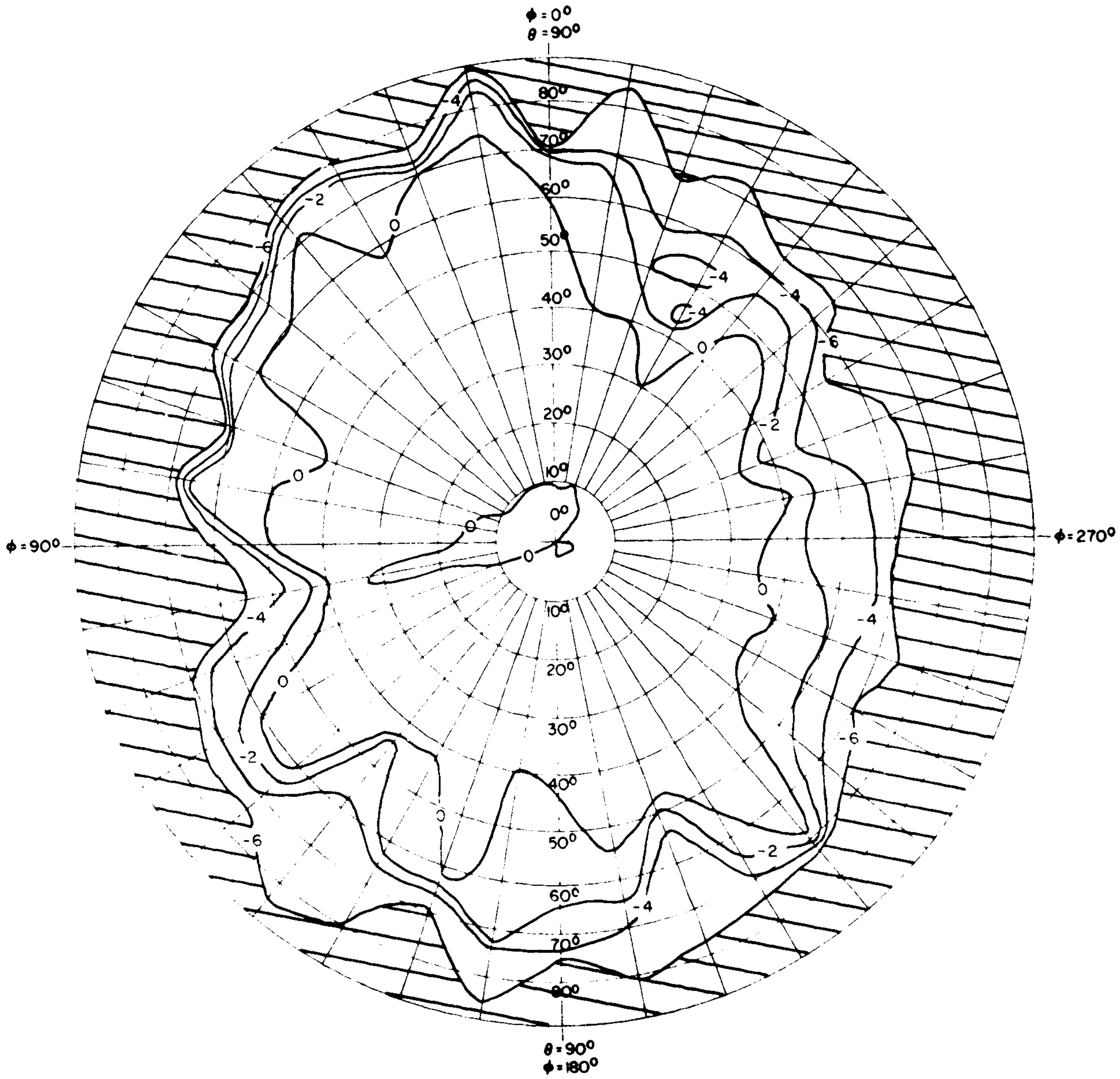

FIG. NO. 224 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT D	POLARIZATION	R.C.
ANTENNA	S Band Omni Array Port A	GAIN REFERENCE	SGH L 7 HORN
FREQUENCY	2287.5 MHz	ENGINEER	C.C. Post
MODEL SCALE	FULL		
REMARKS			
	SOLAR ARRAY (-X)		
	High Gain Antenna (-Z)		
	Cooler Door Open		

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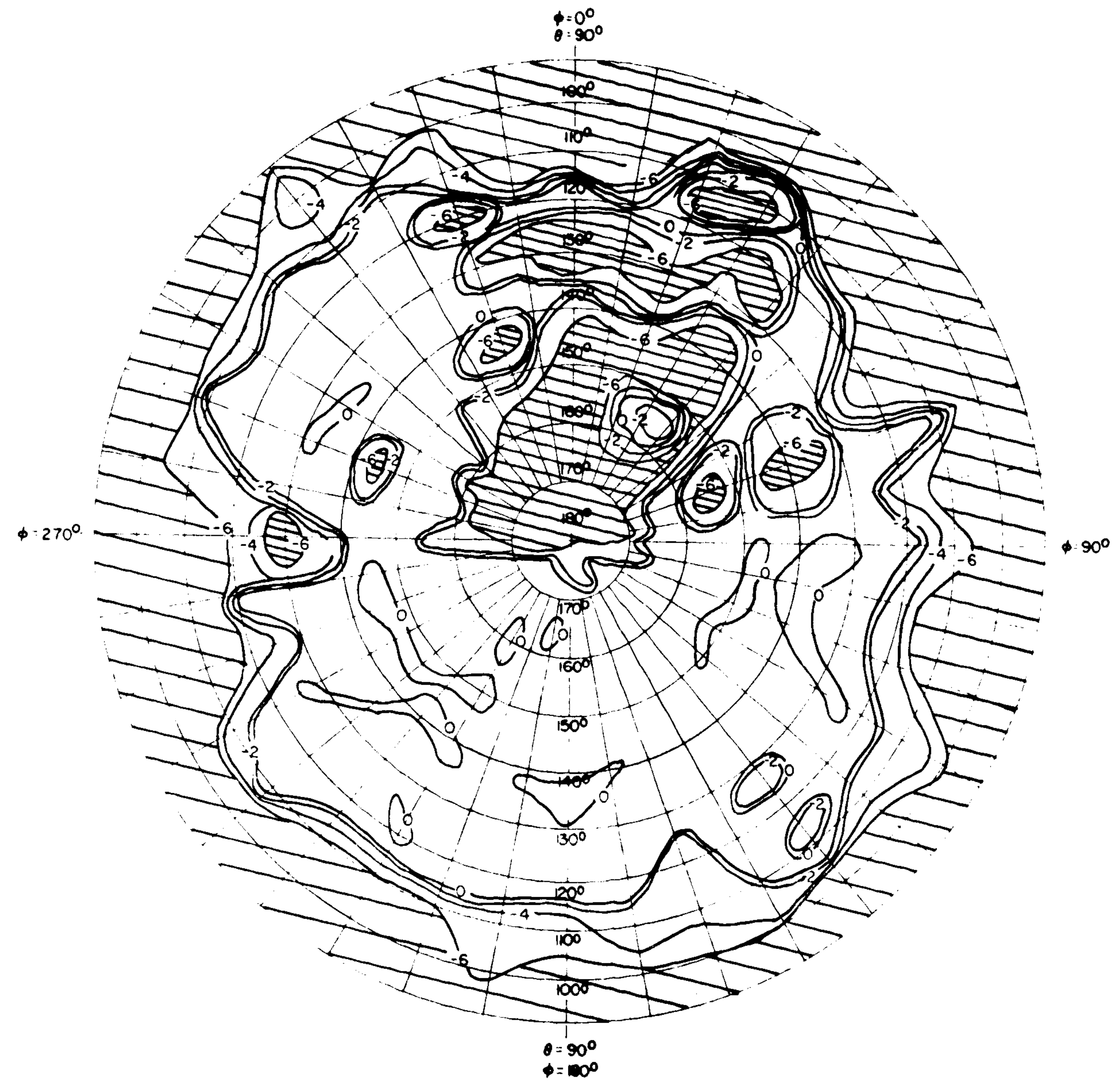

FIG. NO. 225 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT-D	**POLARIZATION**	R.C.
ANTENNA	S-Band Omni Array - Port A	**GAIN REFERENCE**	SCH 1.7 HORN
FREQUENCY	2287.5 MHz	**ENGINEER**	C.C. Post
MODEL SCALE	FULL		
REMARKS			
	SOLAR ARRAY (-X)		
	HIGH-GAIN ANTENNA (-Z)		
	COOLER DOOR OPEN		

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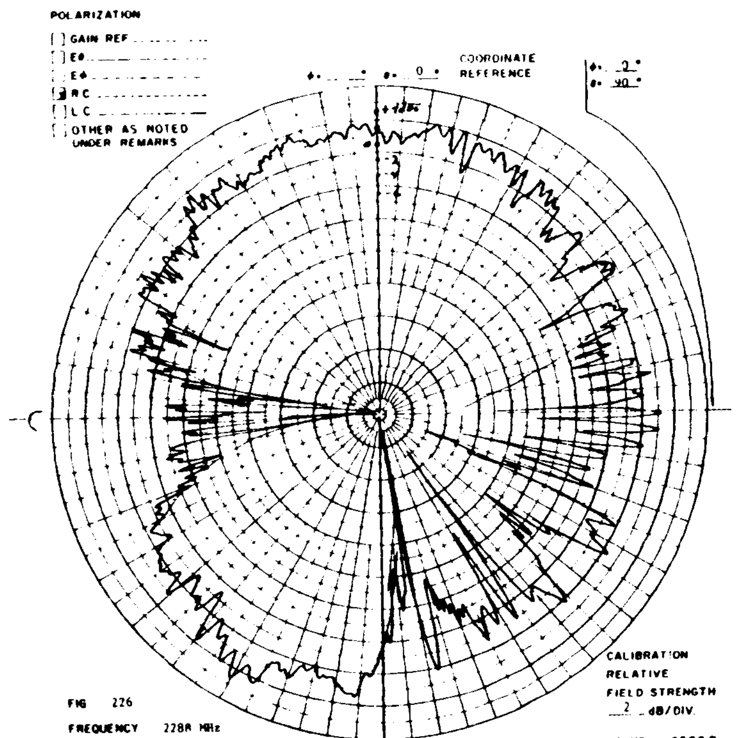

FIG 226
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Port A
REMARKS Solar Array (-X)
High Gain (-Z)

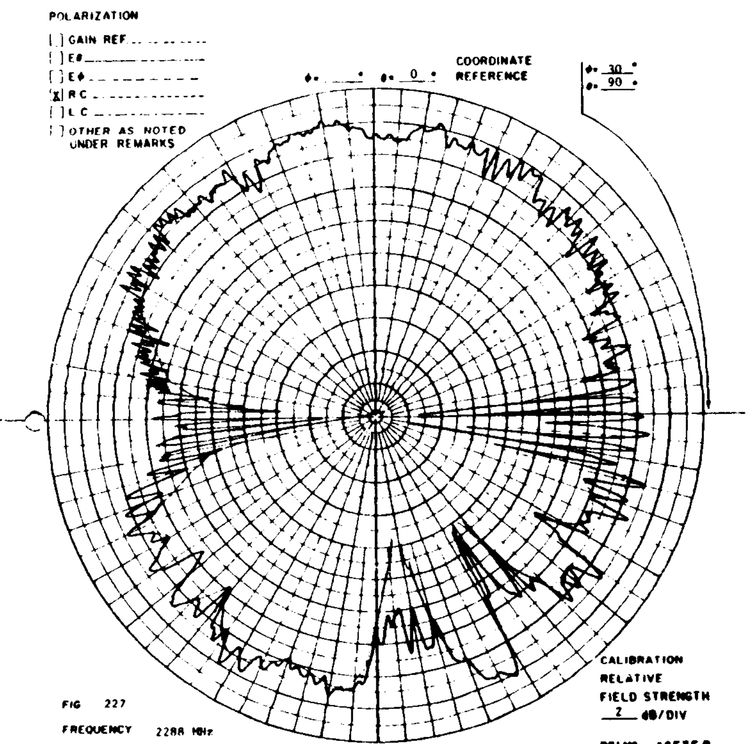

FIG 227
FREQUENCY 2288 MHz
ANTENNA S Band Omni-Port A
REMARKS Solar Array (-X)
High Gain (-Z)

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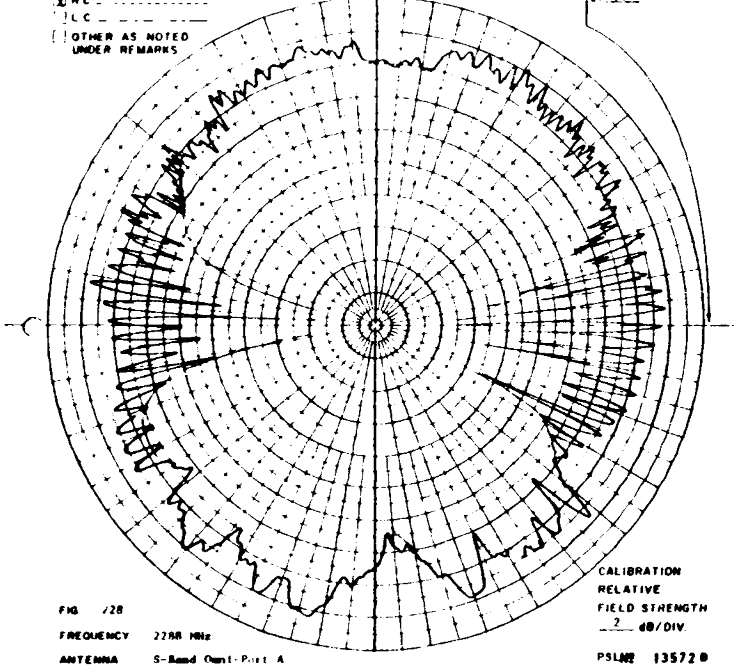
POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[X] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

θ= ___° φ= 0° COORDINATE REFERENCE φ= 60° θ= 90°



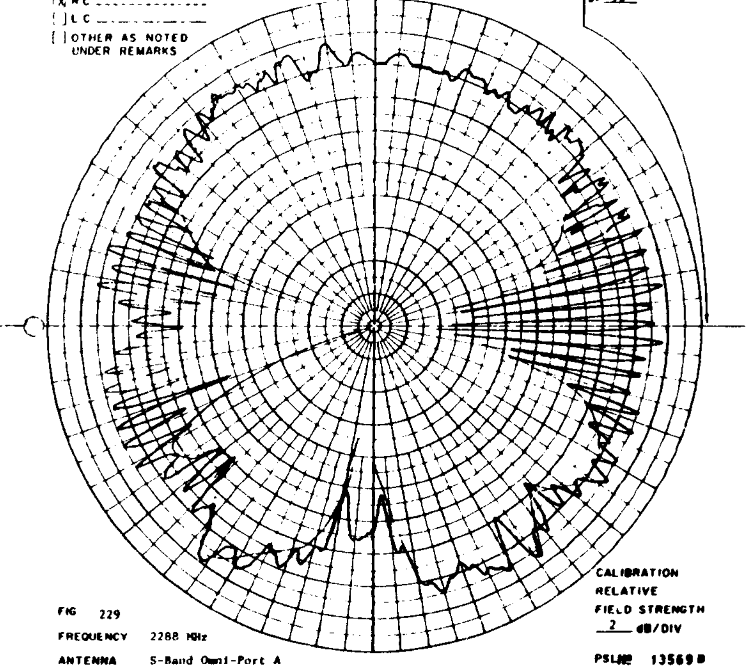
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV

PSL№ 13572B

FIG 228
FREQUENCY 2288 MHz
ANTENNA S-Band Omni-Port A
REMARKS Solar Array (-X)
High Gain (Z)

POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[X] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

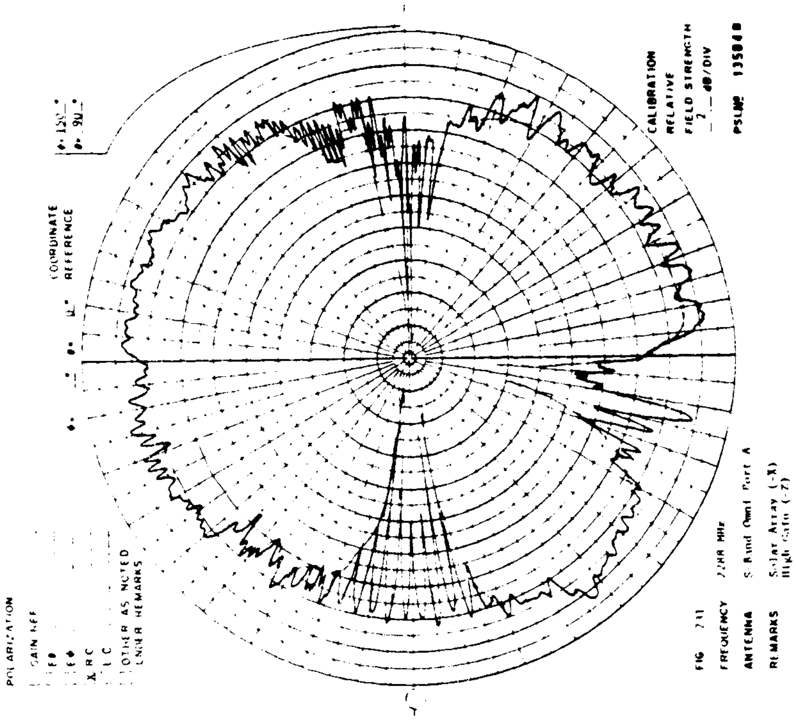
θ= ___° φ= 0° COORDINATE REFERENCE φ= 90° θ= 90°

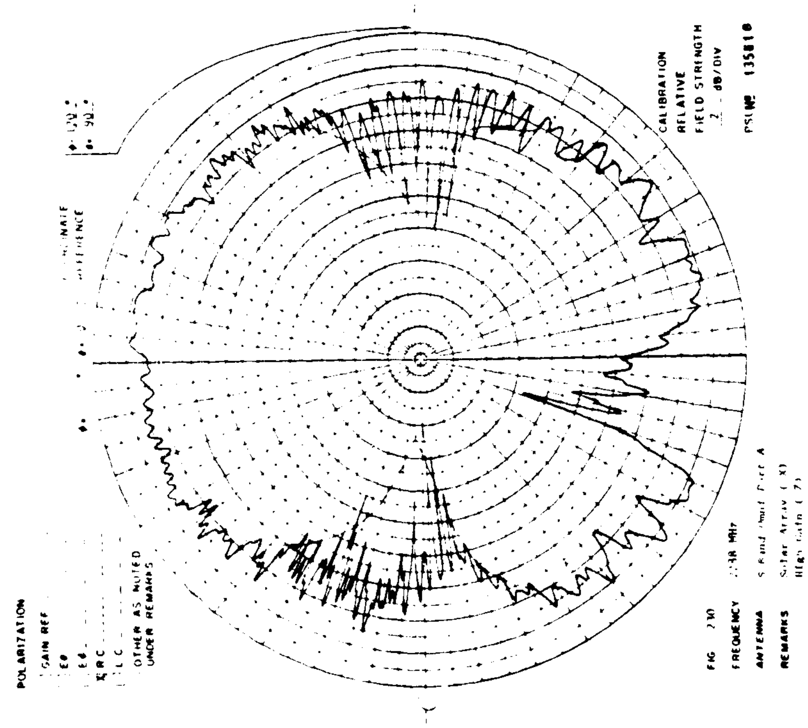


CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV

PSL№ 13569B

FIG 229
FREQUENCY 2288 MHz
ANTENNA S-Band Omni-Port A
REMARKS Solar Array (-X)
High Gain (-Z)


CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
COORDINATE
REFERENCE
POLARIZATION
GAIN REF
OTHER AS NOTED
UNDER REMARKS
FIG 231
FREQUENCY
ANTENNA S Band Omni Port A
REMARKS Solar Array (-X)
High Gain (-Z)


CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
POLARIZATION
GAIN REF
OTHER AS NOTED
UNDER REMARKS
FIG 230
FREQUENCY
ANTENNA
REMARKS

12.13 S-Band Omni Array - Port A - Antenna
Antenna Patterns - 2287.5 MHz - Solar Array (-Z)

12.13.1 R.C. Polarization
High-Gain Antenna (-Z)
Antenna Range Leg Length - 3000 Feet

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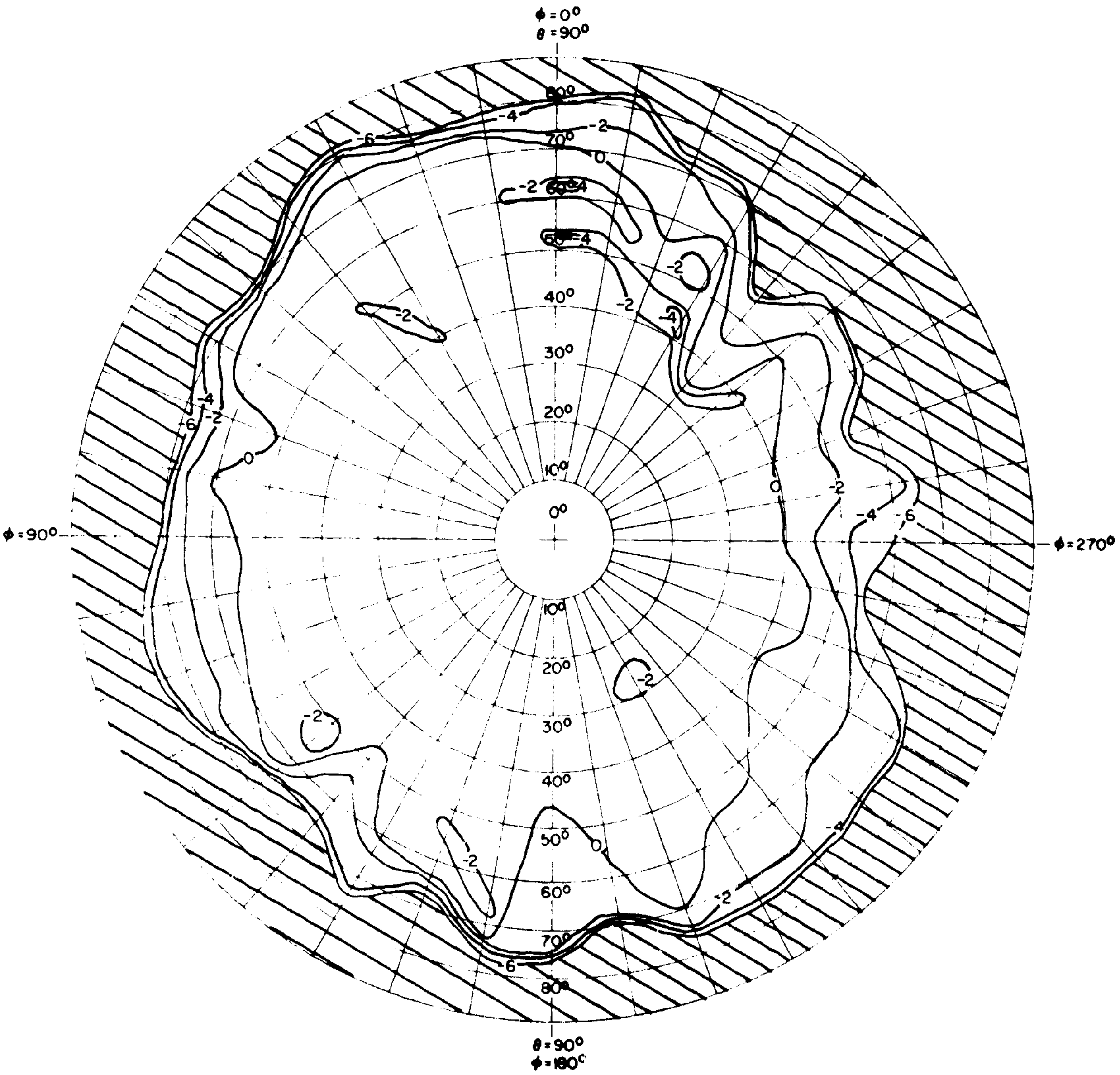


FIG. NO. 232 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT-D	POLARIZATION	R. C.
ANTENNA	S-Band Omni Array Port A	GAIN REFERENCE	SGH-1.7 HORN
FREQUENCY	2287.5 MHz	ENGINEER	C. C. Post
MODEL SCALE	FULL		
REMARKS			
	SOLAR ARRAY (-Z)		
	HIGH-GAIN ANTENNA (-Z)		
	COOLER DOOR OPEN		

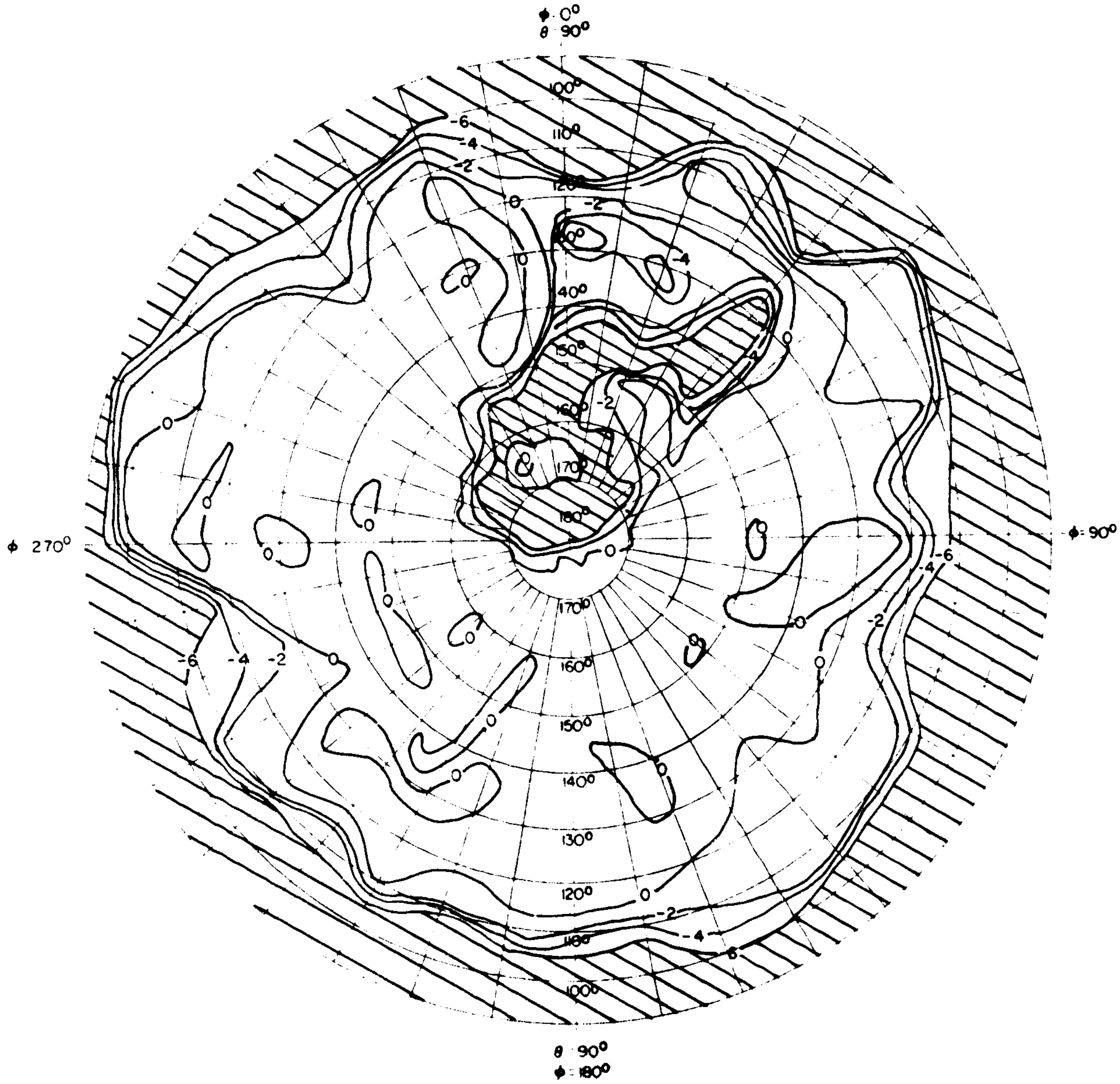
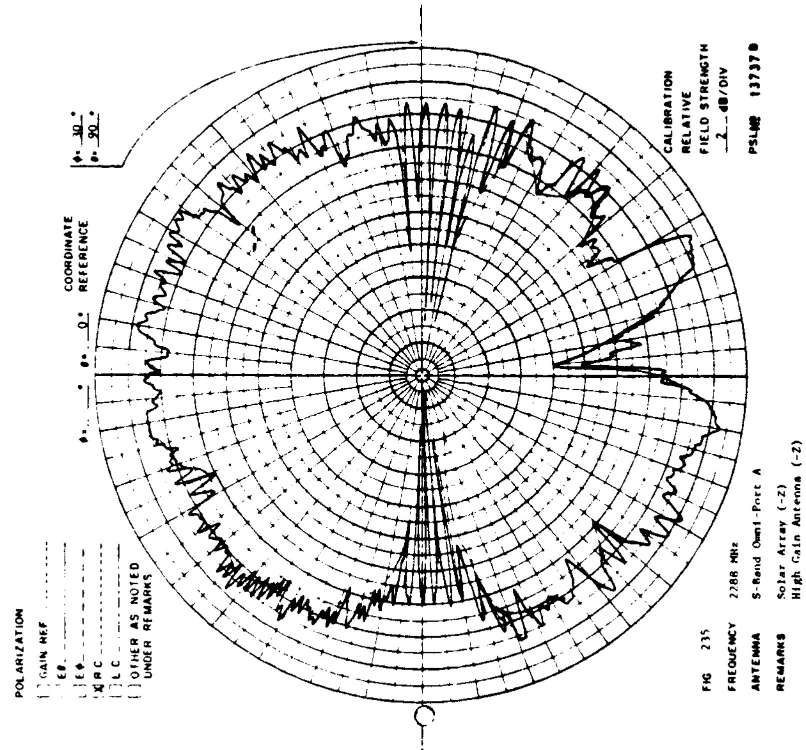
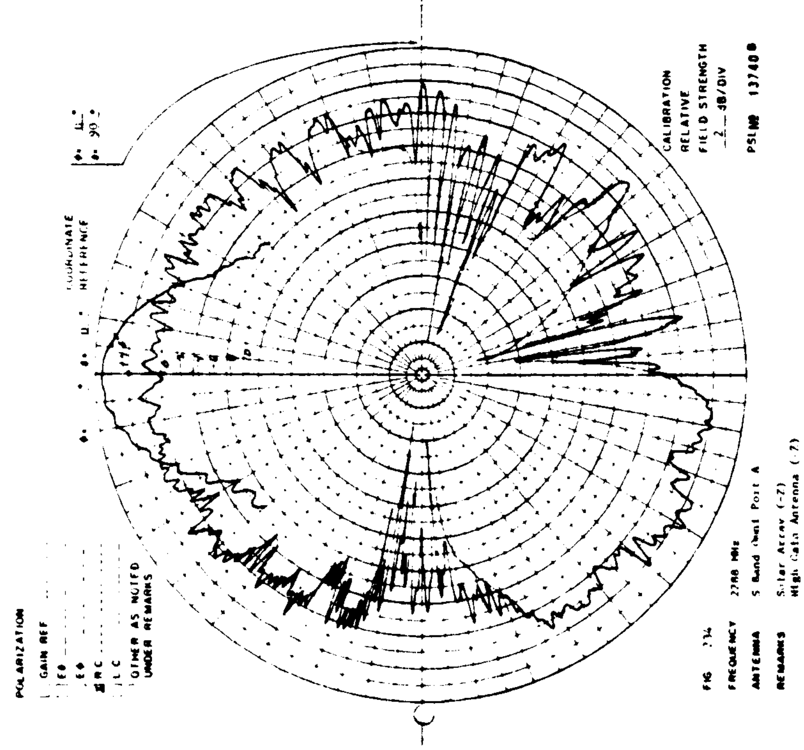


FIG. NO. 233 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT-D	POLARIZATION	R C
ANTENNA	S-Band Omni Array Port A	GAIN REFERENCE	SGH 1.7 HORN
FREQUENCY	2287.5 MHz	ENGINEER	C. C. Post
MODEL SCALE	FULL		
REMARKS			
	SOLAR ARRAY (-Z)		
	HIGH GAIN ANTENNA (-Z)		
	COOLER DOOR OPEN		


POLARIZATION
GAIN REF
RC
OTHER AS NOTED UNDER REMARKS
COORDINATE REFERENCE
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
PSLN№ 137378
FIG 235
FREQUENCY 2288 MHz
ANTENNA S-Band Omni-Port A
REMARKS Solar Array (-Z)
High Gain Antenna (-Z)


POLARIZATION
GAIN REF
RC
OTHER AS NOTED UNDER REMARKS
COORDINATE REFERENCE
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
PSLN№ 137408
FIG 234
FREQUENCY 2288 MHz
ANTENNA S Band Omni Port A
REMARKS Solar Array (-Z)
High Gain Antenna (-Z)

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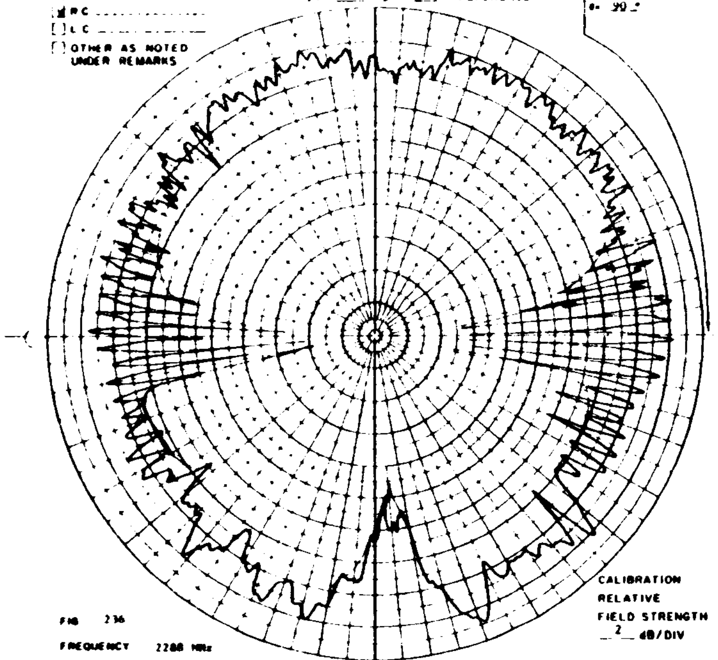
POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[X] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

φ = ___° θ = 0° COORDINATE REFERENCE
φ = 60°
θ = 90°



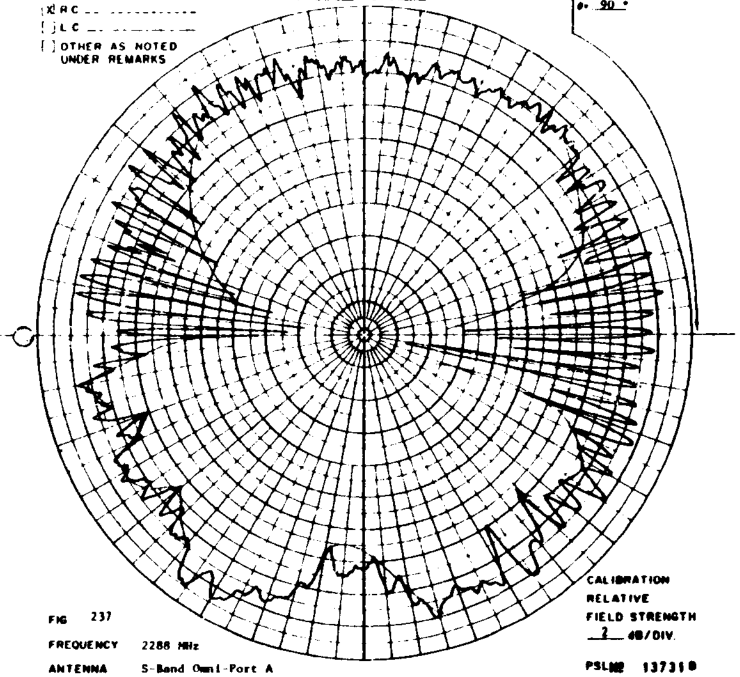
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV

PSL№ 13734 B

FIG 236
FREQUENCY 2288 MHz
ANTENNA S-Band Omni-Port A
REMARKS Solar Array (-Z)
High Gain Antenna (-Z)

POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[X] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

φ = ___° θ = 0° COORDINATE REFERENCE
φ = 90°
θ = 90°



CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.

PSL№ 13731 B

FIG 237
FREQUENCY 2288 MHz
ANTENNA S-Band Omni-Port A
REMARKS Solar Array (-Z)
High Gain Antenna (-Z)

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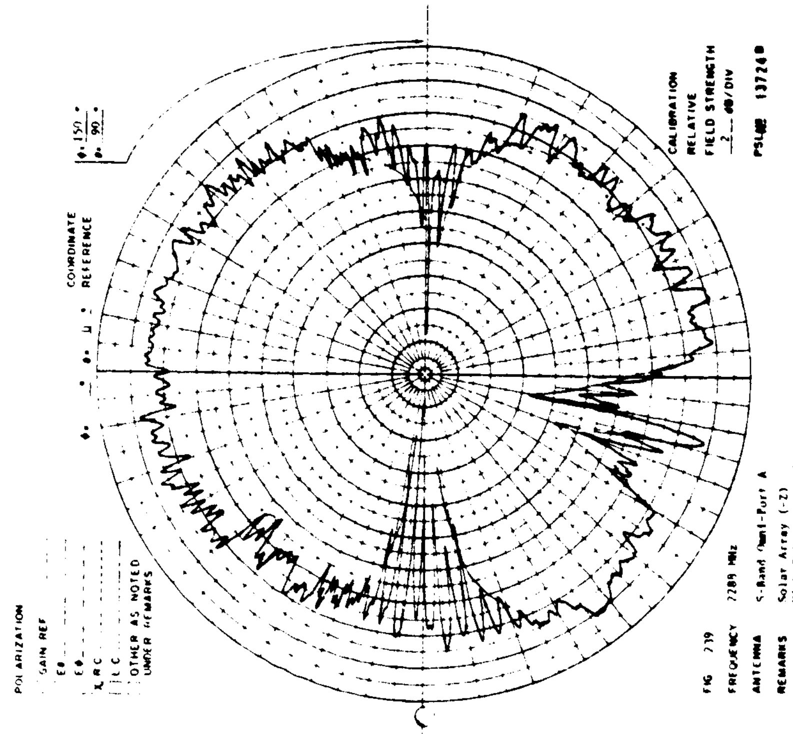

FIG 239
FREQUENCY 2289 MHz
ANTENNA S-Band Omni-Port A
REMARKS Solar Array (-Z)
High Gain Antenna (-Z)

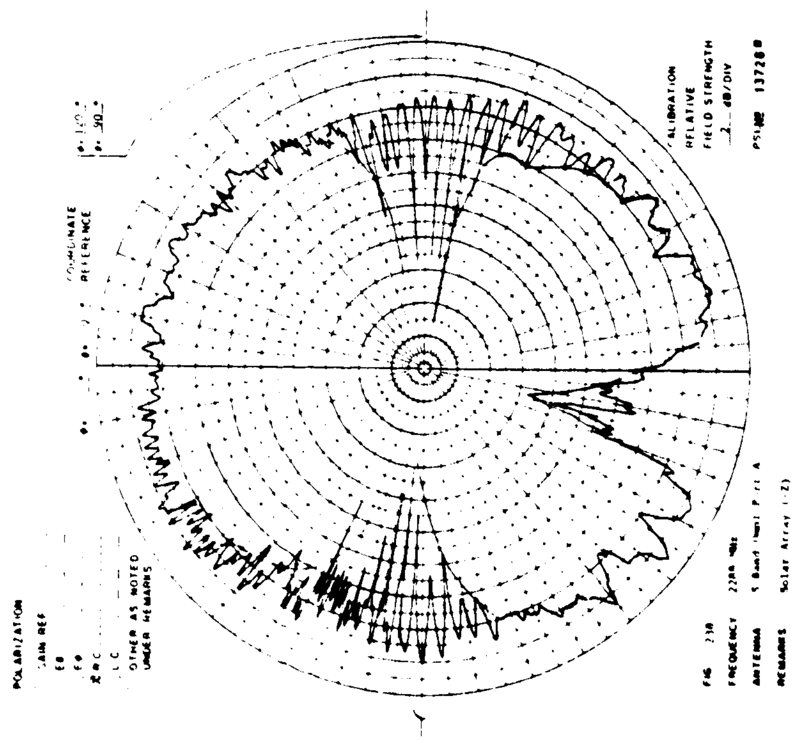

FIG 238
FREQUENCY 2288 MHz
ANTENNA S-Band Omni-Port A
REMARKS Solar Array (-Z)
High Gain Antenna (-Z)

12.14 S-Band Omni Array - Port B - Antenna
Antenna Patterns - 2106 MHz - Solar Array (-X)

12.14.1 R.C. Polarization
High-Gain Antenna (-Z)
Cooler Door Open
Antenna Range Leg Length - 3000 Feet

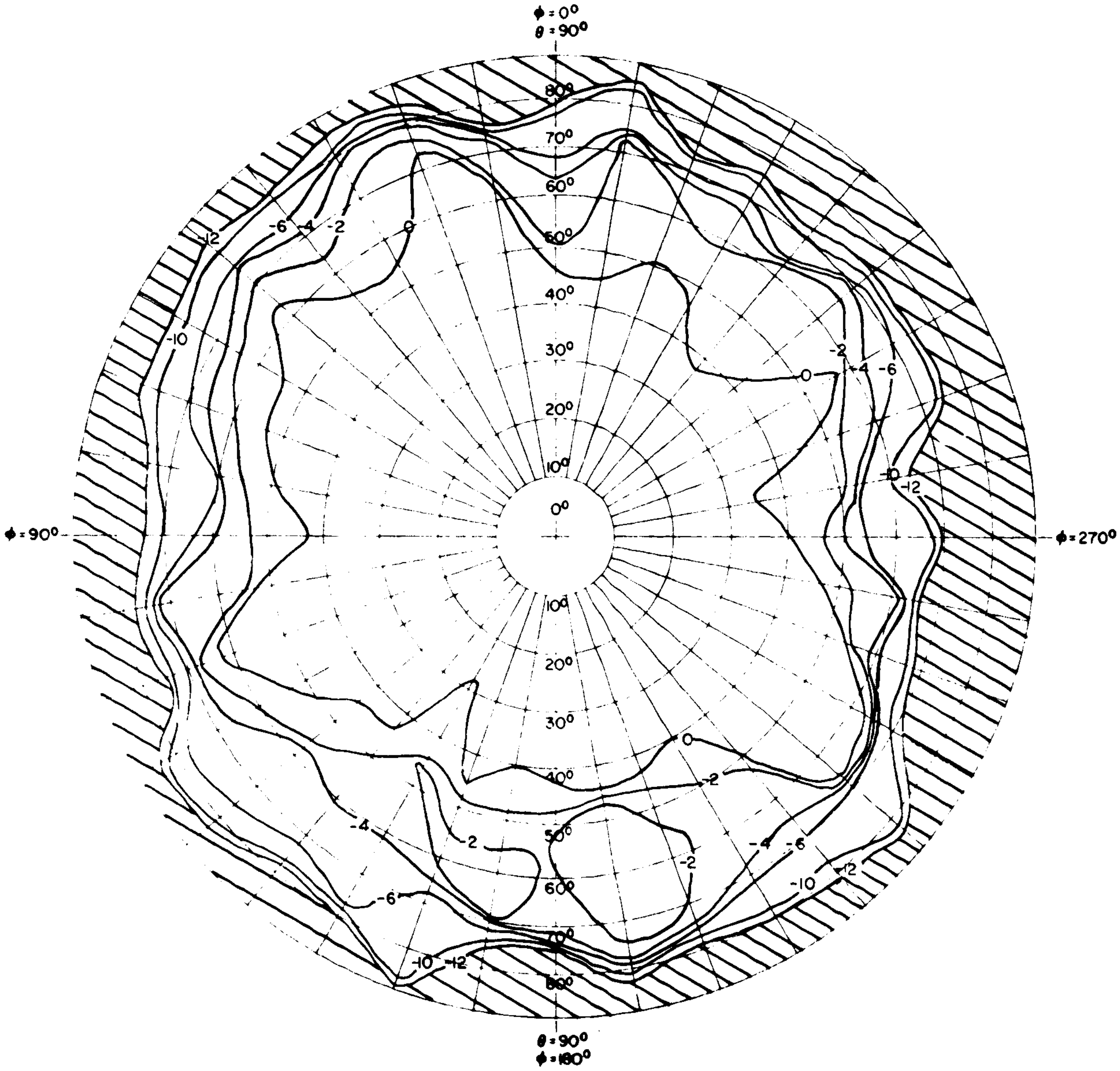

FIG. NO. 240 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT-D	**POLARIZATION**	R.C.
ANTENNA	S-Band Omni Array - Port B	**GAIN REFERENCE**	SGH 1.7 HORN
FREQUENCY	2106 MHz	**ENGINEER**	C.C. Post
MODEL SCALE	FULL		
REMARKS			
	SOLAR ARRAY (-X)		
	HIGH GAIN ANTENNA (-Z)		

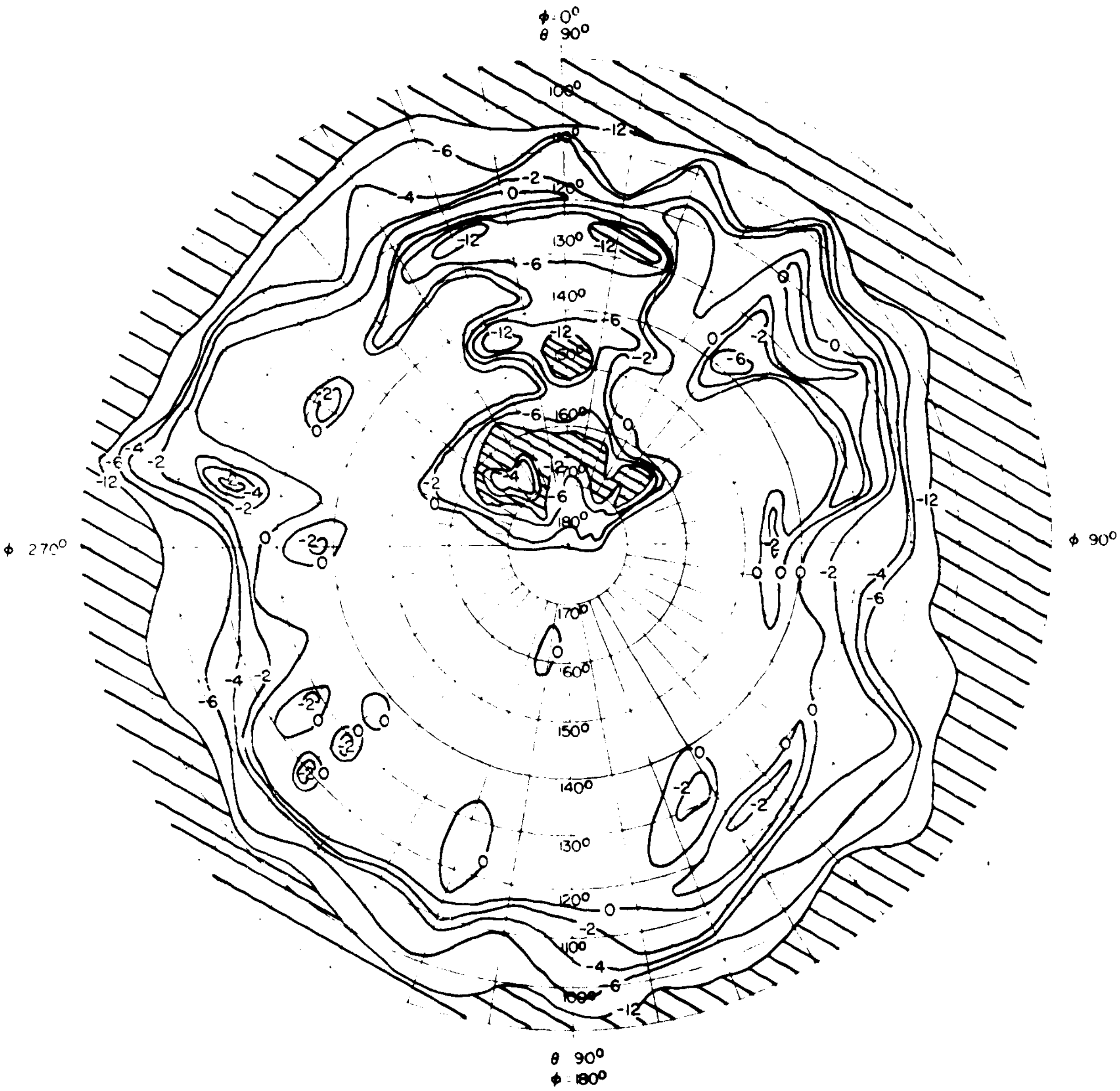

FIG. NO. 241 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT D	POLARIZATION	R.C.
ANTENNA	S Band Omni Array - Port B	GAIN REFERENCE	SGH 1.7 HORN
FREQUENCY	2106 MHz	ENGINEER	C. C. Post
MODEL SCALE	FULL		
REMARKS			
	SOLAR ARRAY (X)		
	HIGH GAIN ANTENNA (Z)		

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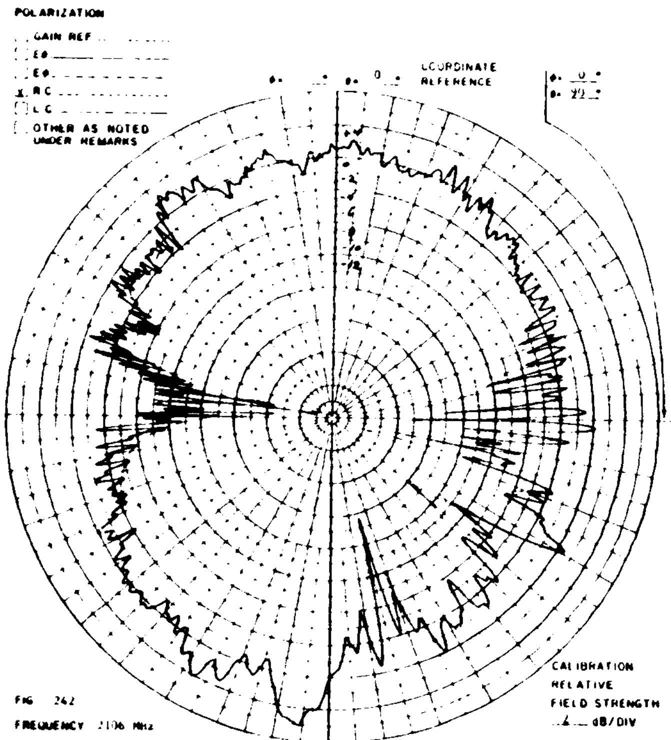

FIG 242
FREQUENCY 2106 MHz
ANTENNA S-Band Omni Part B
REMARKS Solar Array (+x)
High Gain (-Z)
Cooler Door Open

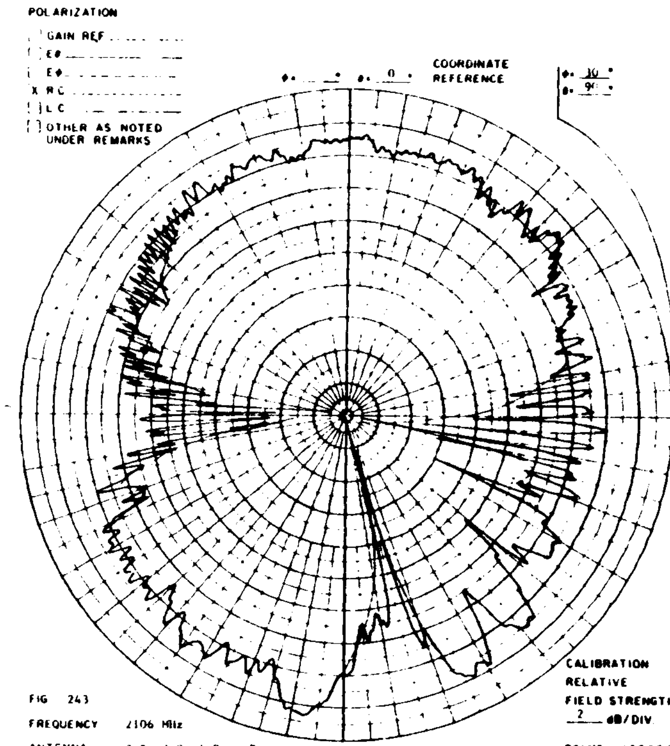

FIG 243
FREQUENCY 2106 MHz
ANTENNA S Band Omni Part B
REMARKS Solar Array (-X)
High Gain (-Z)
Cooler Door Open

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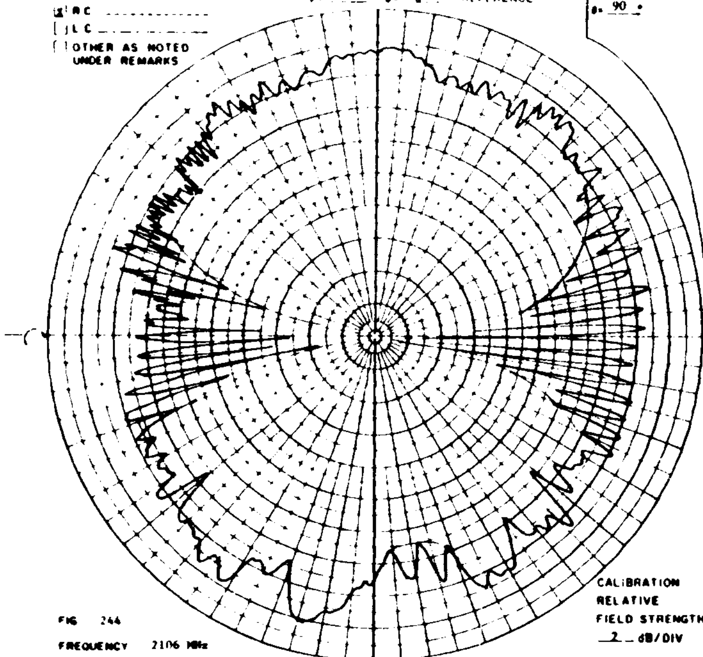
POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[X] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

φ= ___° θ= 0 ° COORDINATE REFERENCE φ= 60 ° θ= 90 °



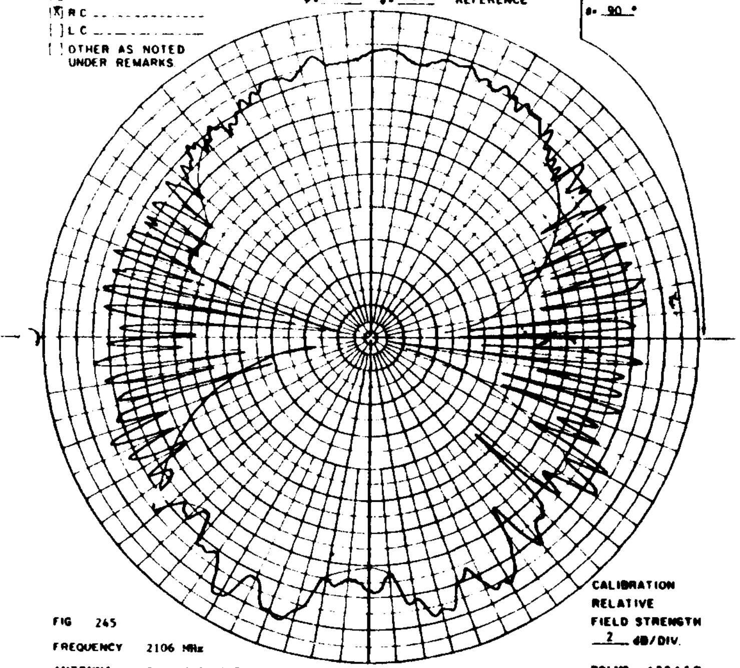
CALIBRATION RELATIVE FIELD STRENGTH 2 dB/DIV

PSL№ 136170

FIG 244
FREQUENCY 2106 MHz
ANTENNA S-Band Omni-Port B
REMARKS Solar Array (-x) High Gain (-z) Cooler Door Open

POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[X] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

φ= ___° θ= 0 ° COORDINATE REFERENCE φ= 90 ° θ= 90 °



CALIBRATION RELATIVE FIELD STRENGTH 2 dB/DIV.

PSL№ 136140

FIG 245
FREQUENCY 2106 MHz
ANTENNA S-Band Omni-Port B
REMARKS Solar Array (-x) High Gain (-z) Cooler Door Open

POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[■] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

COORDINATE REFERENCE
θ = 0 °
φ = 120 °
θ = 90 °

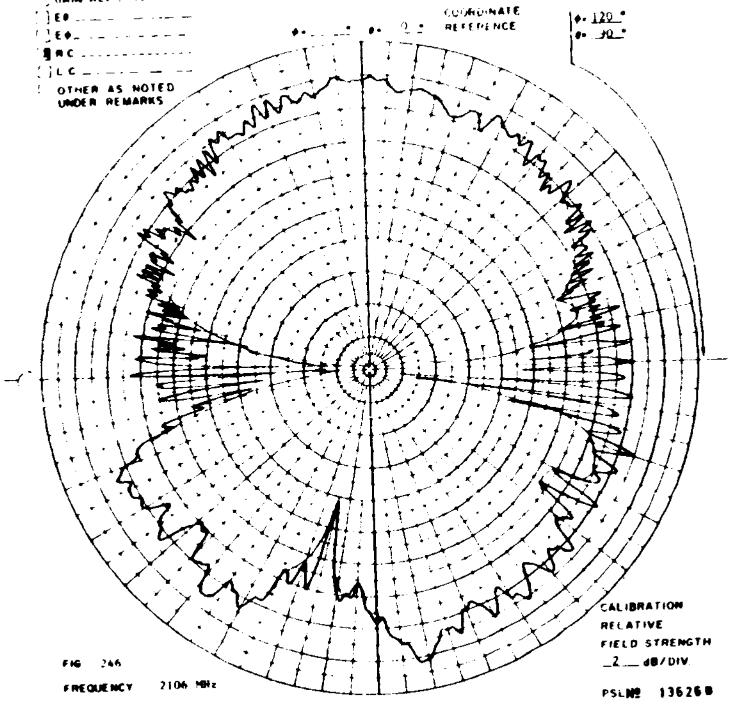


FIG 246
FREQUENCY 2106 MHz
ANTENNA S-Band Omni Port B
REMARKS Solar Array (-X)
High Gain (-Z)
Cooler Door Open

CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
PSL№ 136260

POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[x] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

COORDINATE REFERENCE
θ = 0 °
φ = 150 °
θ = 90 °

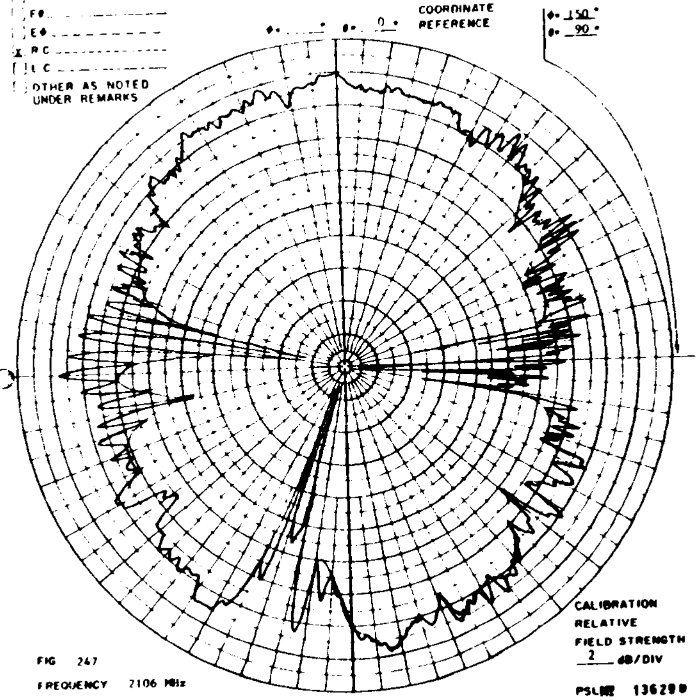


FIG 247
FREQUENCY 2106 MHz
ANTENNA S-Band Omni-Port B
REMARKS Solar Array (-X)
High Gain (-Z)
Cooler Door Open

CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
PSL№ 136290

12.15 S-Band Omni Array - Port B - Antenna
Antenna Patterns - 2106 MHz - Solar Array (-Z)

12.15.1 R.C. Polarization
High-Gain Antenna (-Z)
Cooler Door Open
Antenna Range Leg Length - 3000 Feet

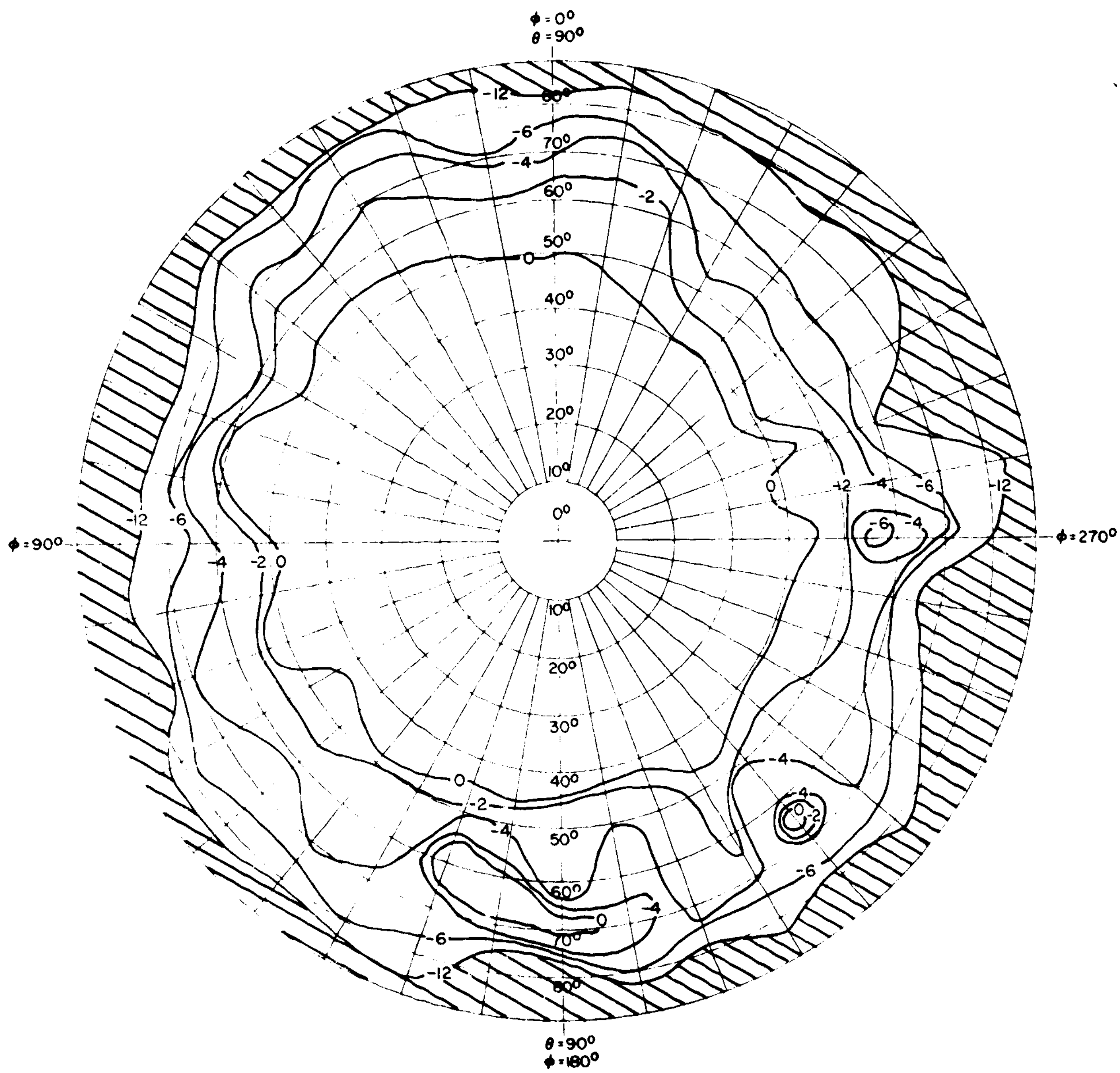


FIG. NO. 248 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT-D	POLARIZATION	R.C.
ANTENNA	S Band Omni Array Port A	GAIN REFERENCE	SGH 1.7 HORN
FREQUENCY	2106 MHz	ENGINEER	C.C. Post
MODEL SCALE	FULL		
REMARKS			
	SOLAR ARRAY (-Z)		
	HIGH-GAIN ANTENNA (-Z)		

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FIG. NO. 249 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT D	POLARIZATION	R.C.
ANTENNA	S-Band Omni Array Port B	GAIN REFERENCE	SGH-1.7 HORN
FREQUENCY	2106 MHz	ENGINEER	C. C. Post
MODEL SCALE	FULL		
REMARKS			
	SOLAR ARRAY (-Z)		
	HIGH-GAIN ANTENNA (-Z)		

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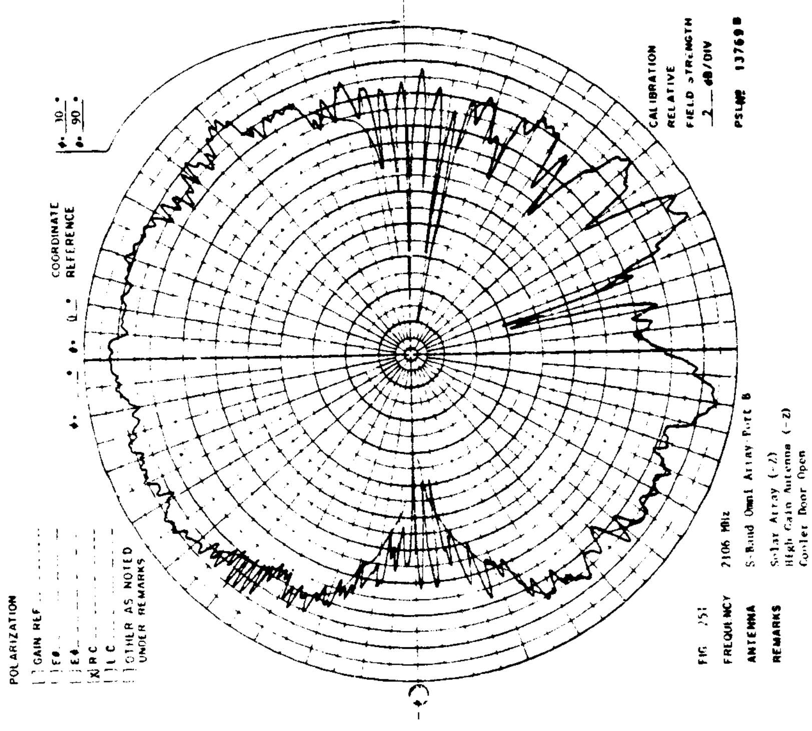

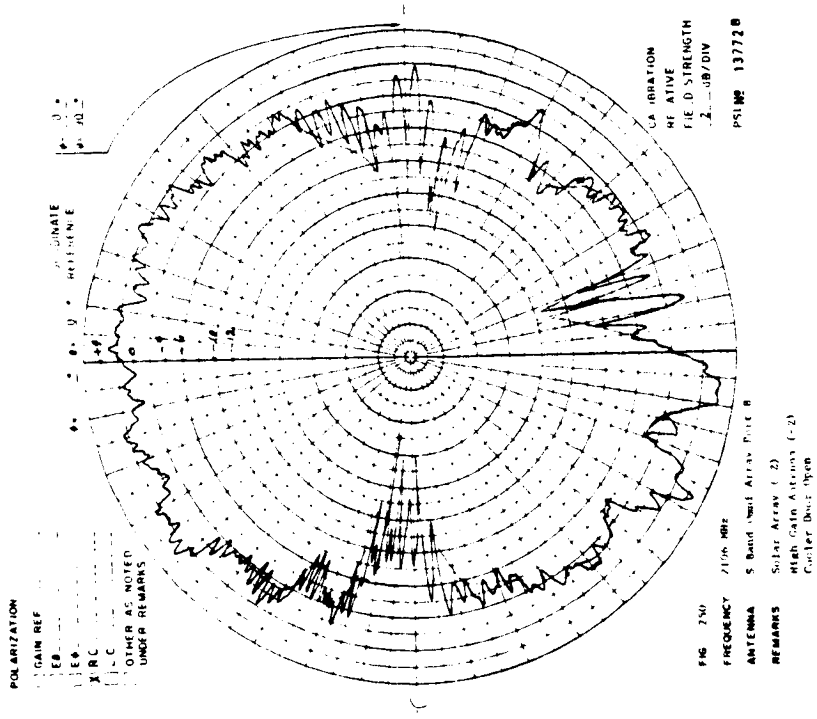

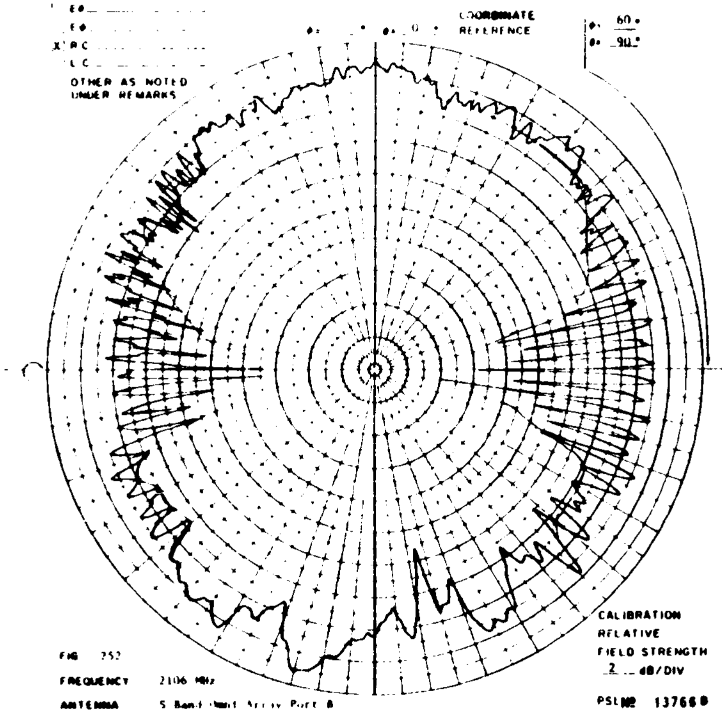

FIG 252
FREQUENCY 2106 MHz
ANTENNA S-Band Omni Array Port B
REMARKS Solar Array (-Z)
High Gain Antenna (-Z)
Cooler Door Open

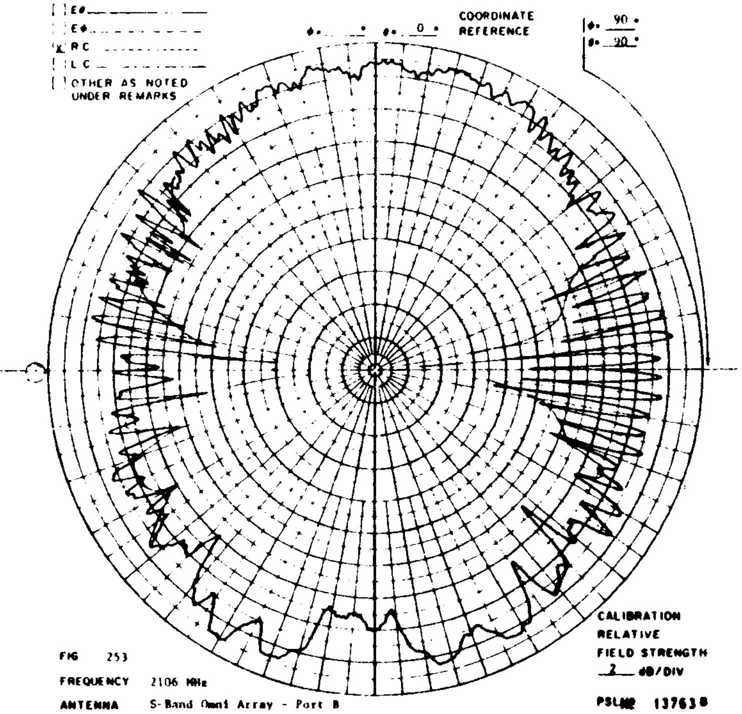

FIG 253
FREQUENCY 2106 MHz
ANTENNA S-Band Omni Array - Port B
REMARKS Solar Array (-Z)
High Gain Antenna (-Z)
Cooler Door Open

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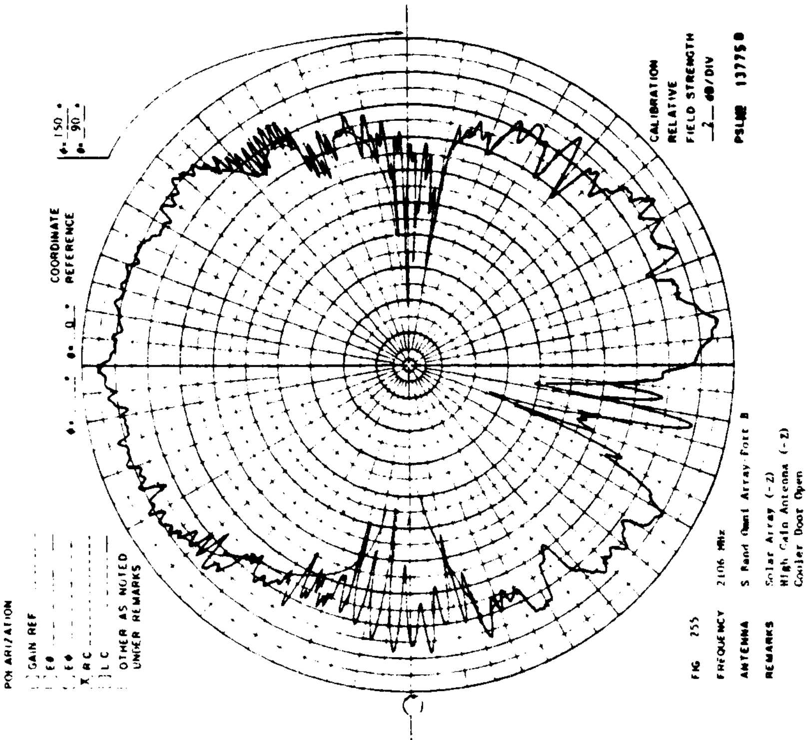

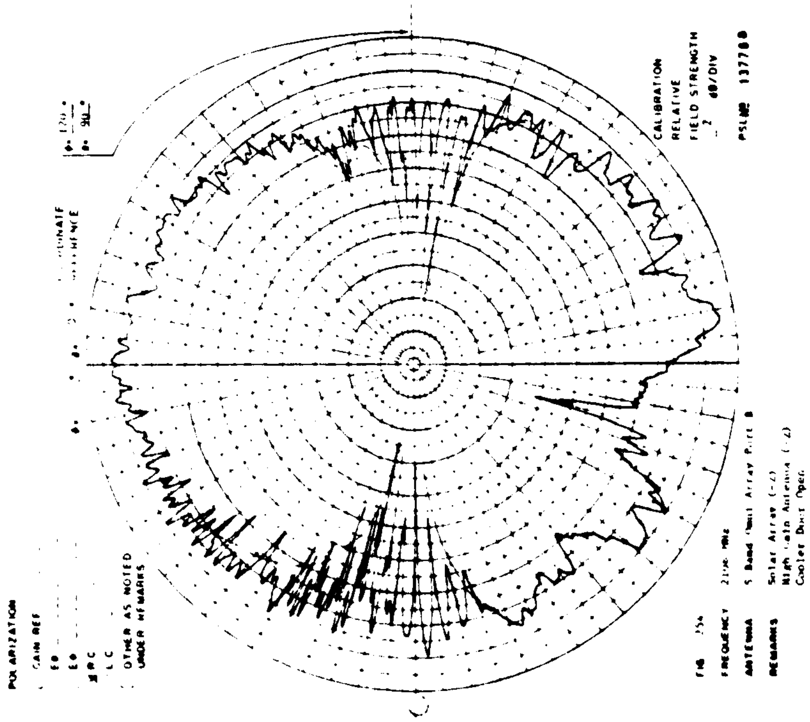

12.16 S-Band Omni Array - Port B - Antenna
Antenna Patterns - 2287.5 MHz - Solar Array (-X)

12.16.1 R.C. Polarization
High-Gain Antenna (-Z)
Cooler Door Open
Antenna Range Leg Length - 3000 Feet

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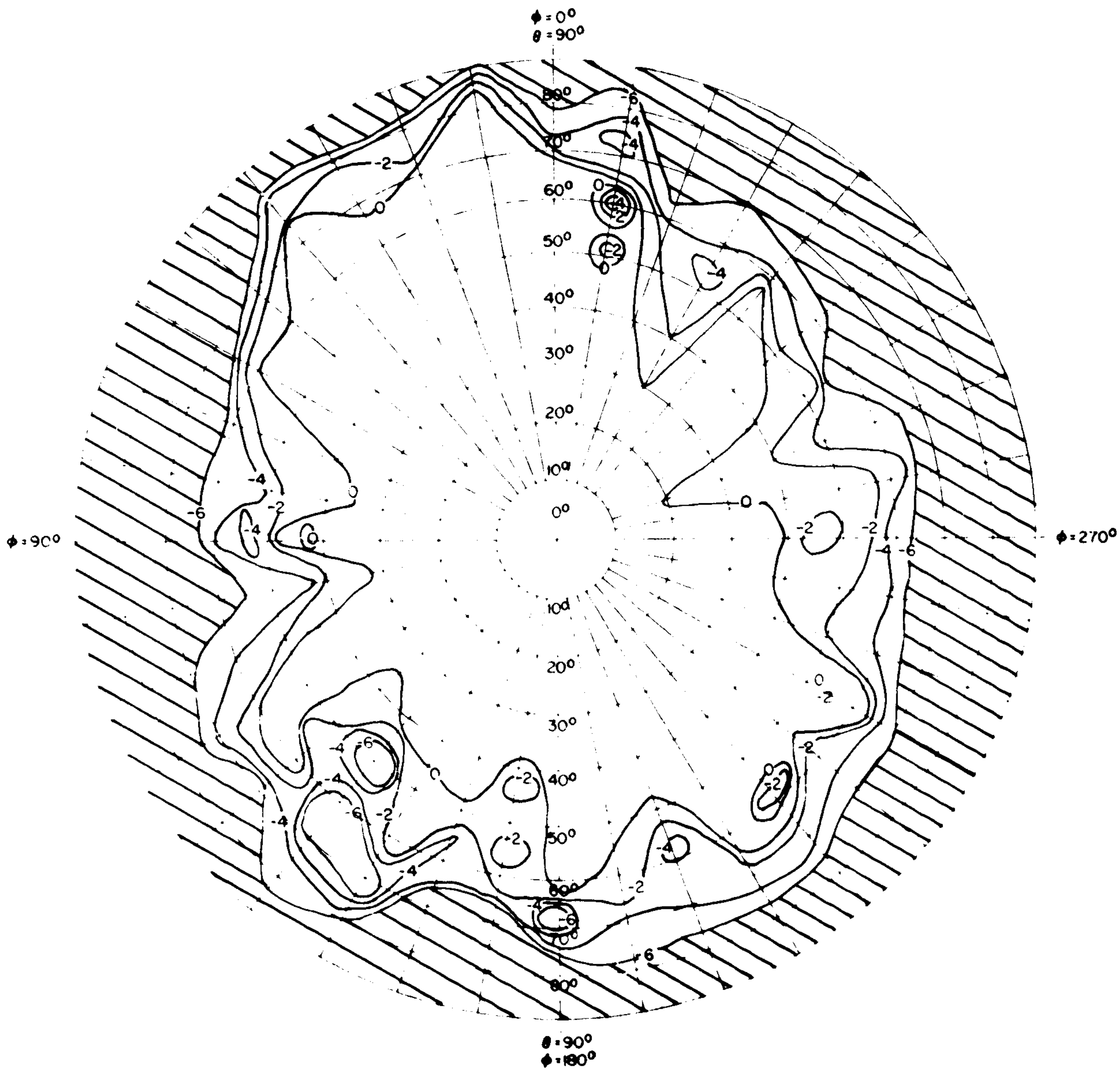

FIG. NO. [illegible] POWER CONTOUR GRAPH			
PROGRAM	[illegible]	POLARIZATION	[illegible]
ANTENNA	S-Band Omni Array Port B	GAIN REFERENCE	[illegible]
FREQUENCY	[illegible] MHz	ENGINEER	[illegible]
MODEL SCALE	[illegible]		
REMARKS			
	SOLAR ARRAY [illegible]		
	HIGH GAIN ANTENNA [illegible]		

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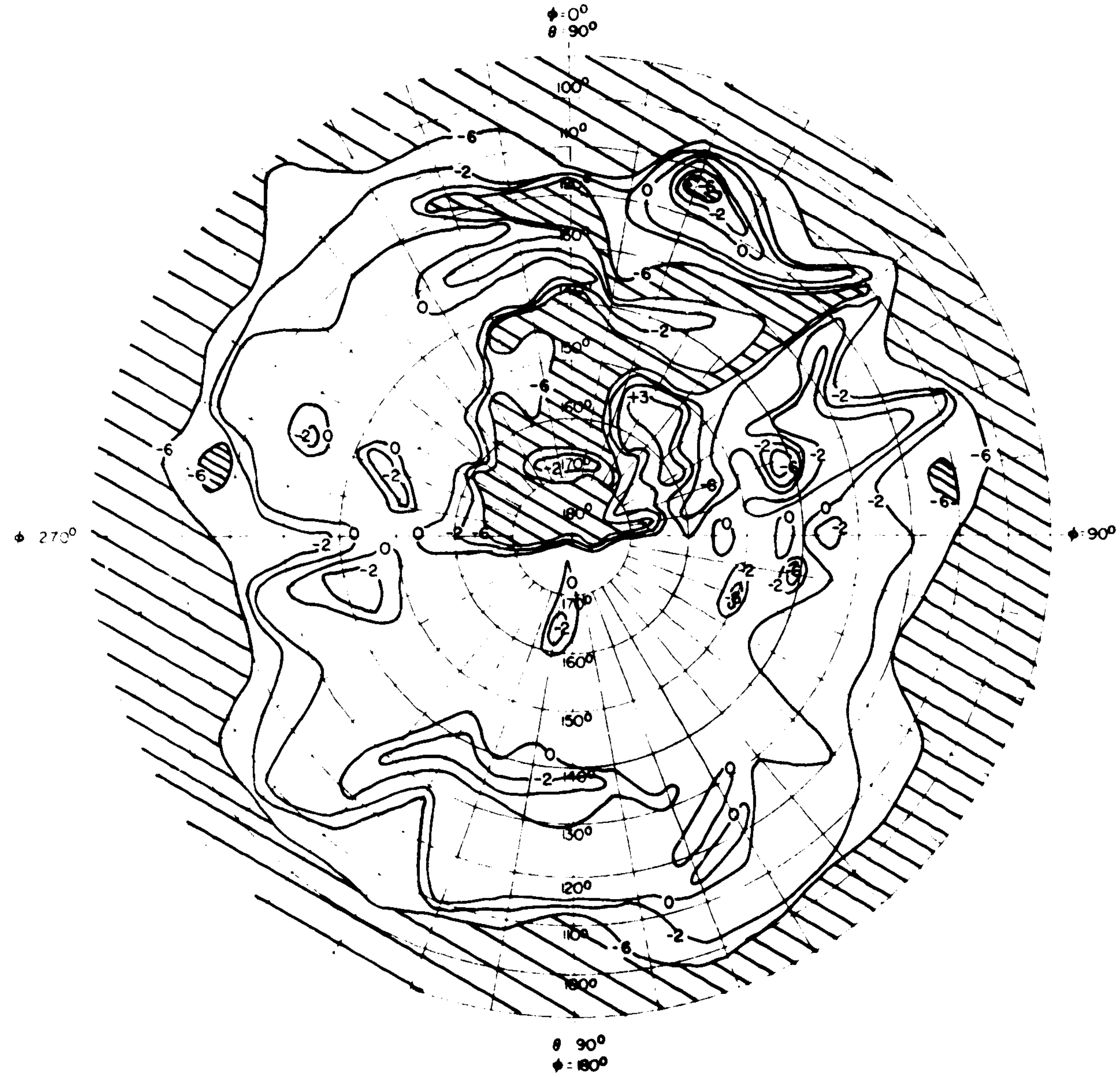

FIG. NO. 251 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT-D	POLARIZATION	R.C.
ANTENNA	S Band Omni Array Port B	GAIN REFERENCE	SGH 1.7 HORN
FREQUENCY	2287.5 MHz	ENGINEER	C.C. Post
MODEL SCALE	FULL		
REMARKS			
	SOLAR ARRAY (-X)		
	HIGH GAIN ANTENNA (-Z)		

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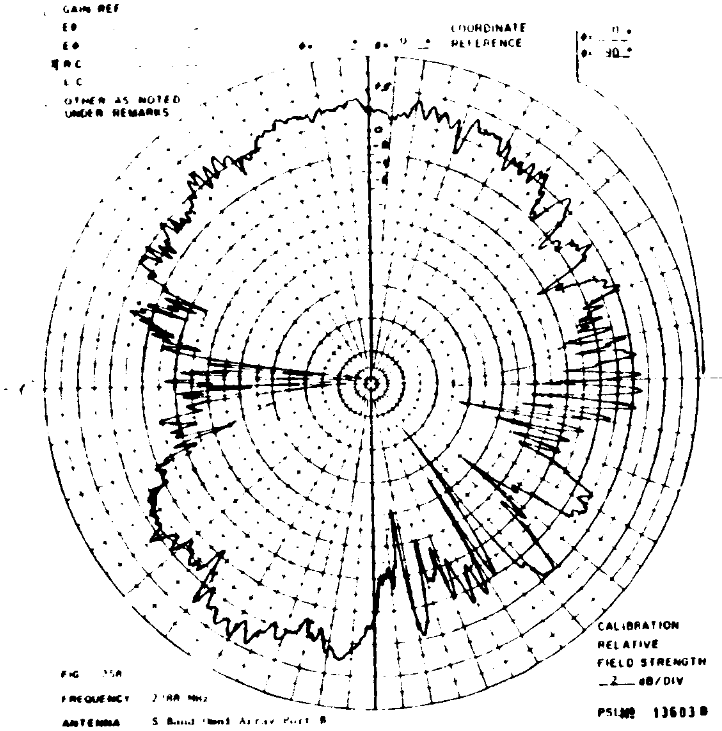


FIG 258

FREQUENCY 2288 MHz

ANTENNA S Band Omni Array Port B

REMARKS Solar Array (X)
High Gain Antenna (-Z)
Cooler Door Open

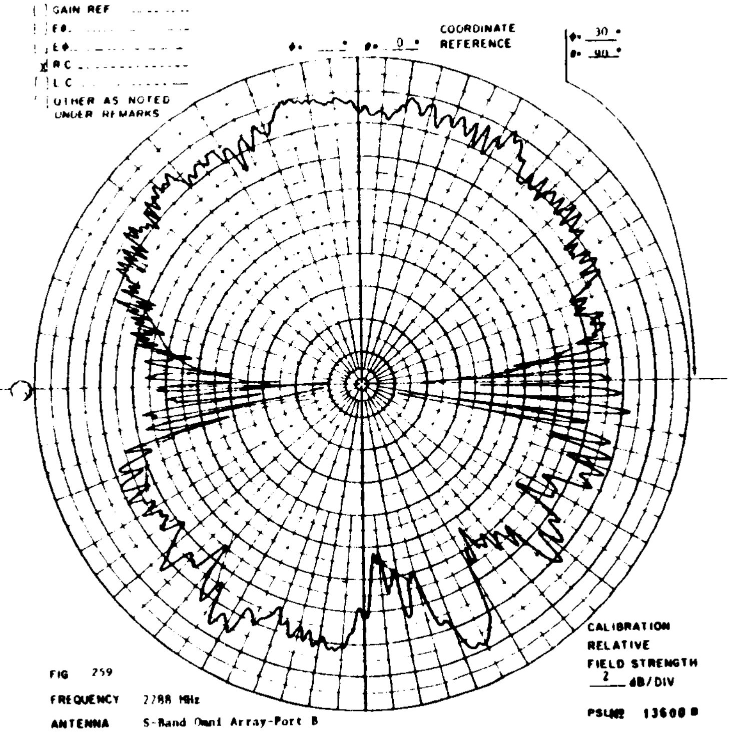
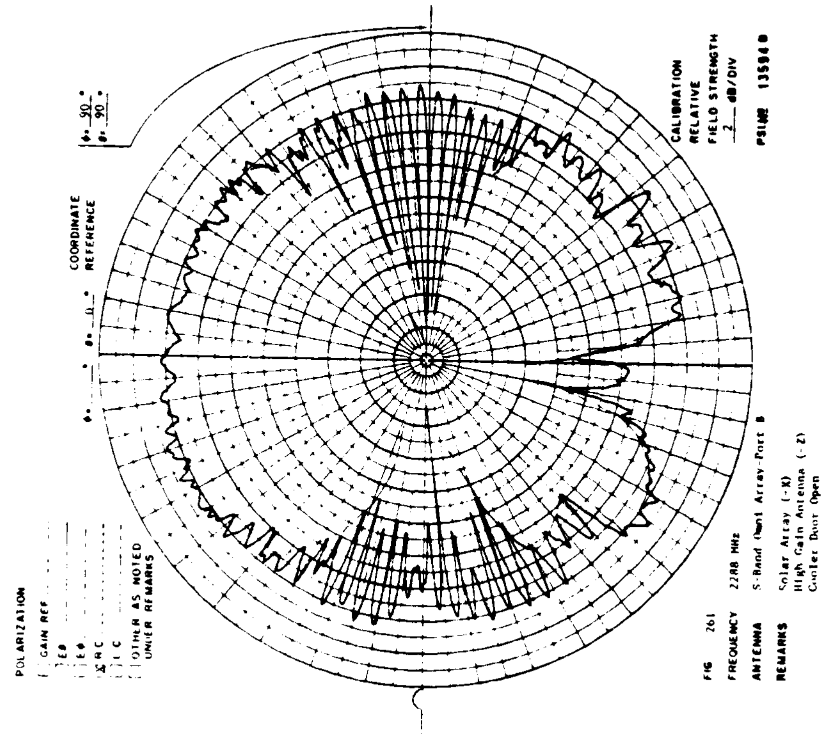


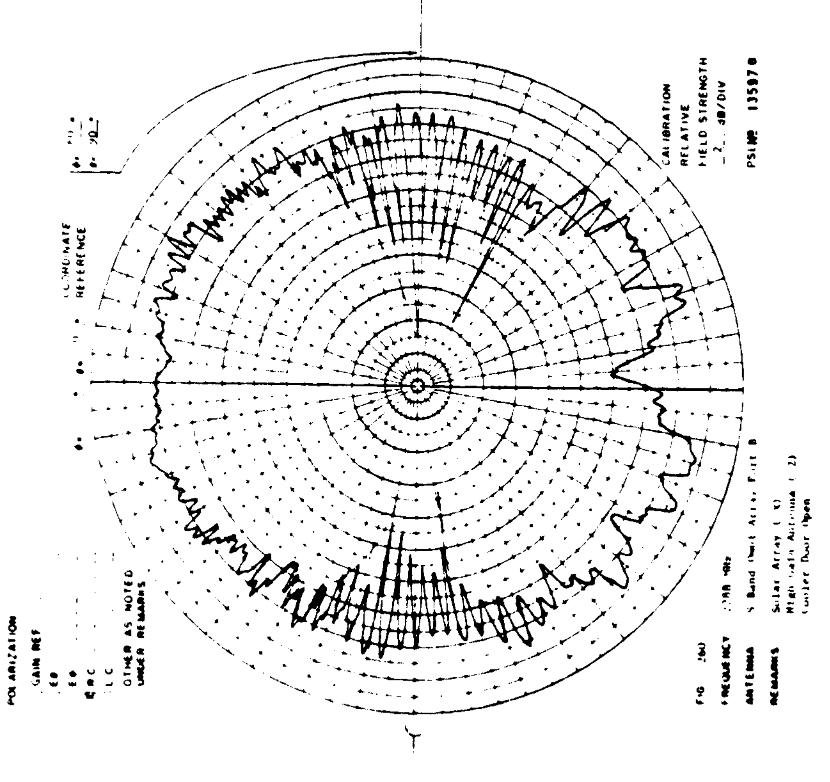
FIG 259

FREQUENCY 2288 MHz

ANTENNA S-Band Omni Array-Port B

REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Open


POLARIZATION
GAIN REF
OTHER AS NOTED
UNDER REMARKS
COORDINATE
REFERENCE
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
FIG 261
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Array-Port B
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Open


POLARIZATION
GAIN REF
OTHER AS NOTED
UNDER REMARKS
REFERENCE
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
FREQUENCY
ANTENNA
REMARKS
Cooler Door Open

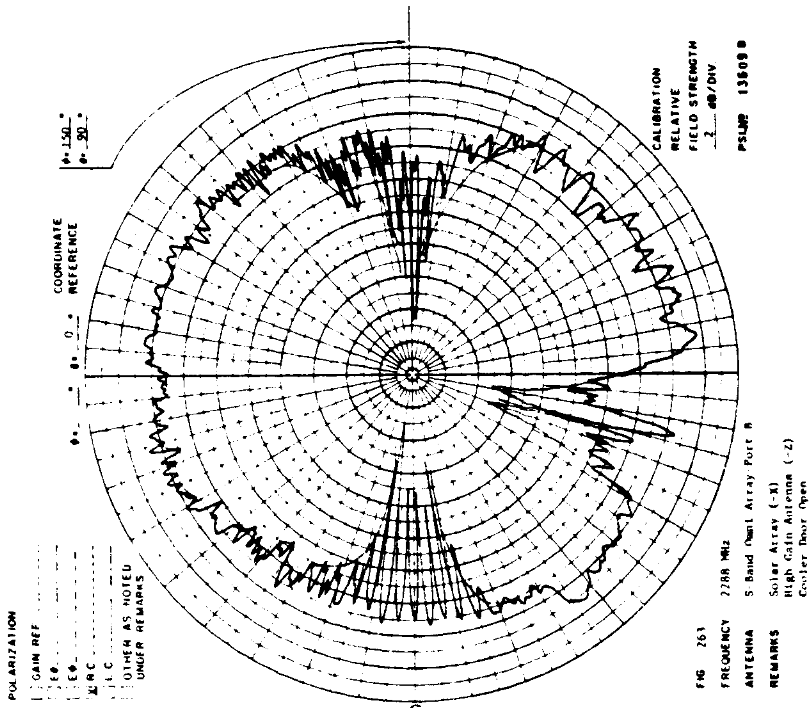


FIG 261
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Array Port B
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Open

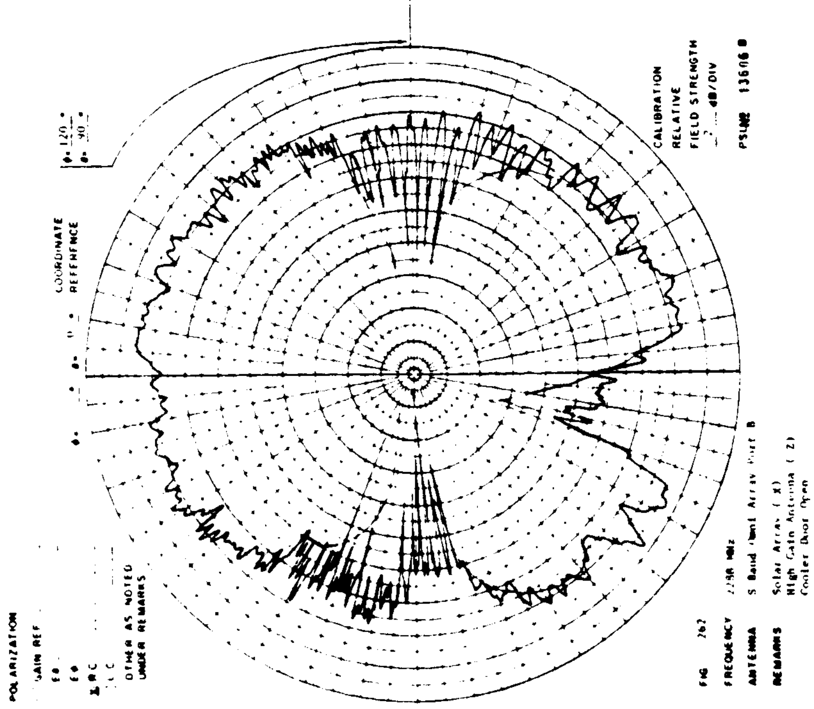


FIG 262
FREQUENCY 2288 MHz
ANTENNA S Band Omni Array Port B
REMARKS Solar Array (X)
High Gain Antenna (Z)
Cooler Door Open

12.17 S-Band Omni Array - Port B - Antenna
Antenna Patterns - 2287.5 MHz - Solar Array (-Z)

12.17.1 R.C. Polarization
High-Gain Antenna (-Z)
Cooler Door Open
Antenna Range Leg Length - 3000 Feet

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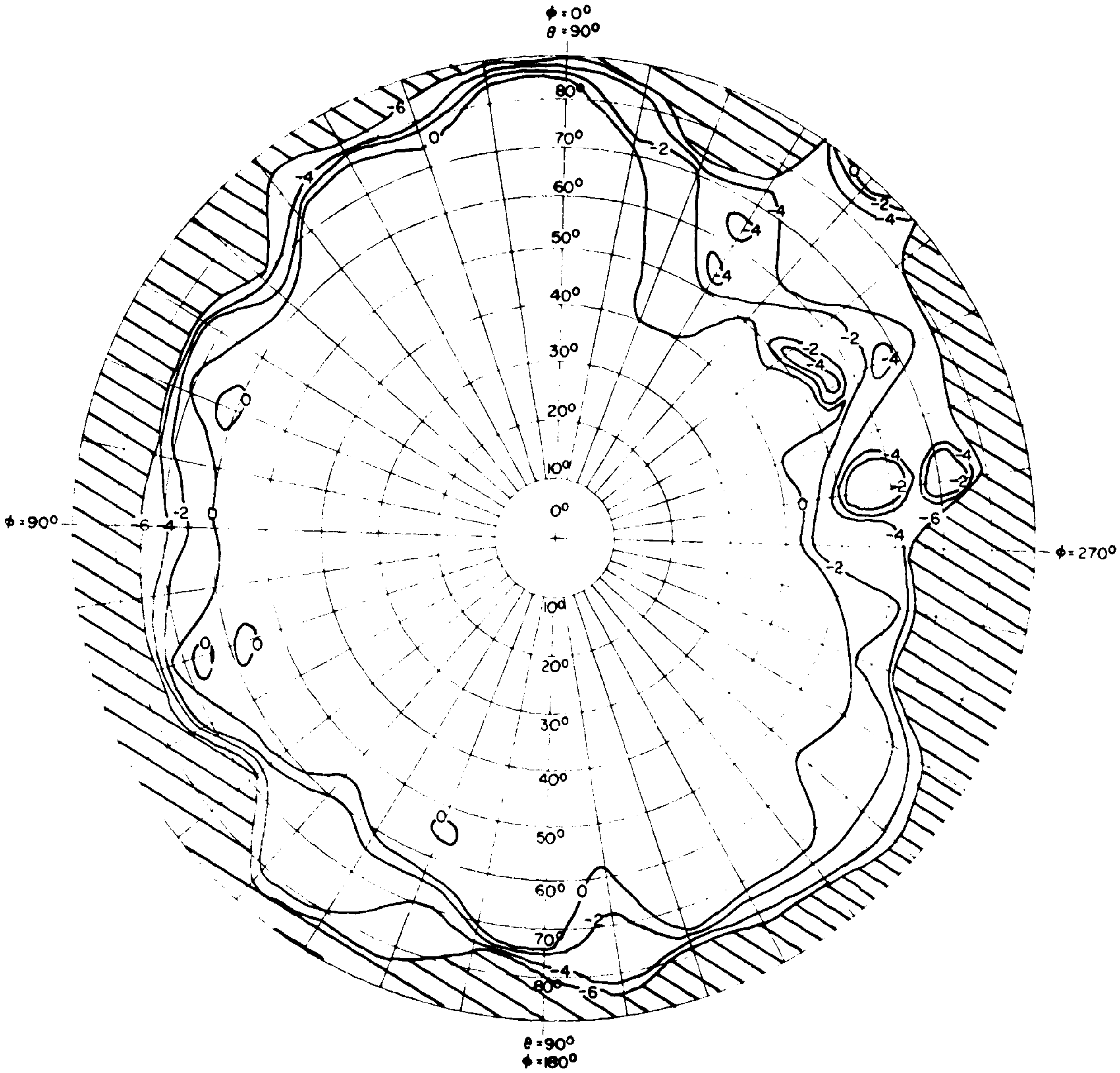

FIG. NO. 264 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT D	POLARIZATION	R.C.
ANTENNA	S-Band Omni Array Port B	GAIN REFERENCE	SGH-1.7 HORN
FREQUENCY	2287.5 MHz	ENGINEER	C.C. Post
MODEL SCALE	FULL		
REMARKS			
SOLAR ARRAY (-Z)			
HIGH GAIN ANTENNA (-Z)			

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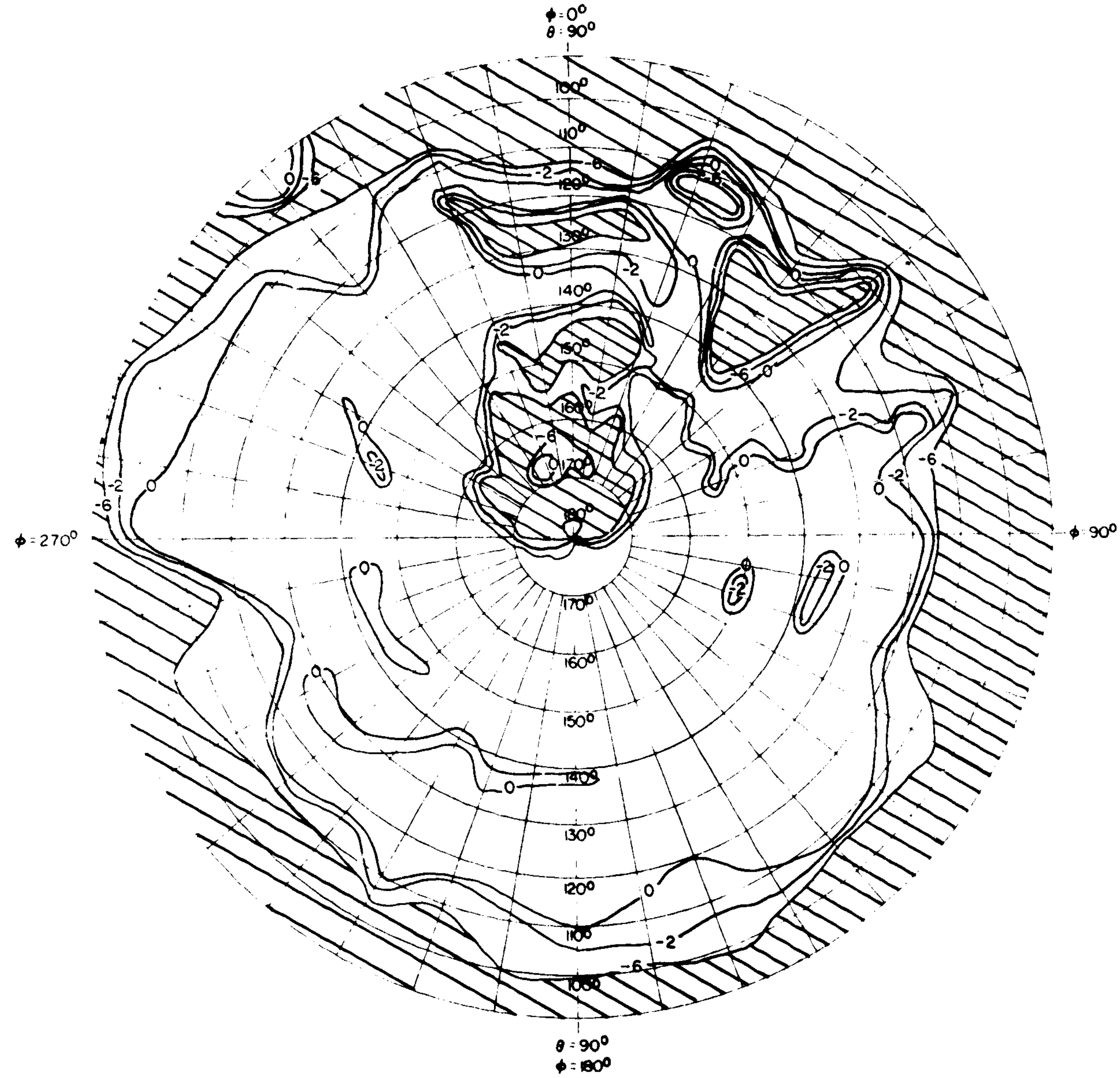
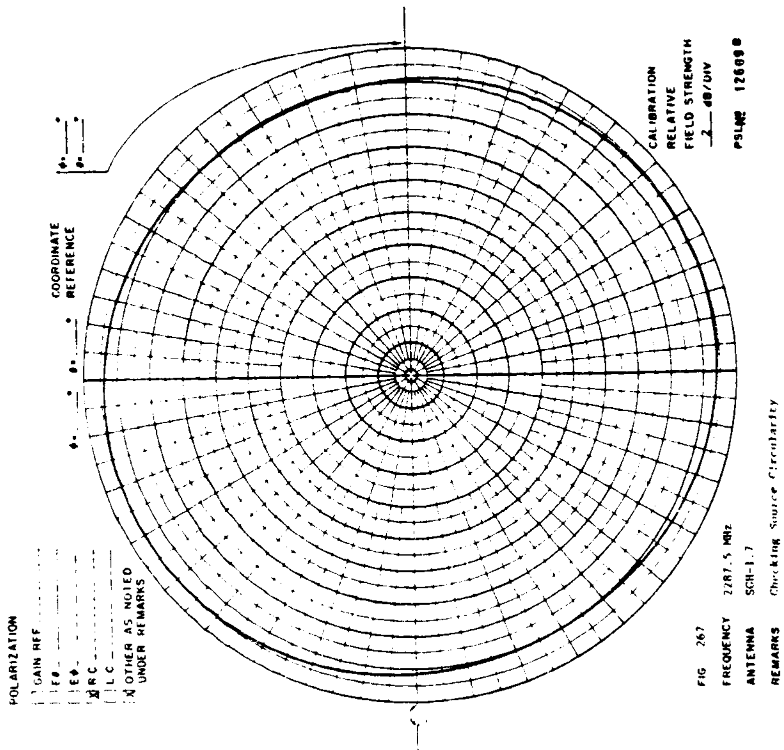
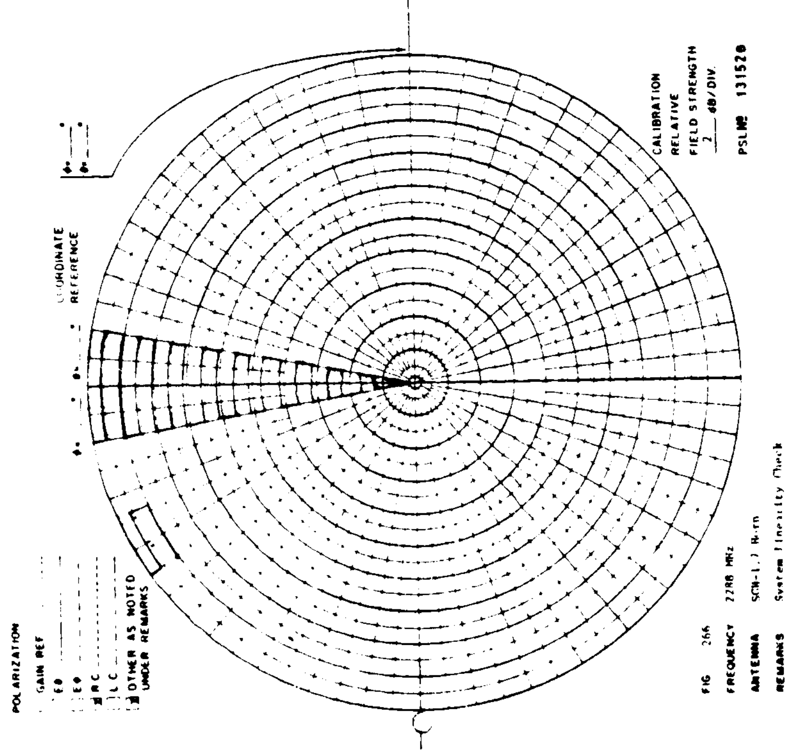


FIG. NO. 265 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT D	POLARIZATION	R.C.
ANTENNA	S Band Omni Array Port B	GAIN REFERENCE	SGH 1.7 HORN
FREQUENCY	2287.5 MHz	ENGINEER	C.C. Post
MODEL SCALE	FULL		
REMARKS			
	SOLAR ARRAY (Z)		
	HIGH GAIN ANTENNA (Z)		


POLARIZATION
GAIN REF
Eθ
Eφ
RC
LC
OTHER AS NOTED UNDER REMARKS
COORDINATE REFERENCE
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
PSL №
FIG 267
FREQUENCY 2287.5 MHz
ANTENNA SCH-1.7
REMARKS Checking Source Circularity


POLARIZATION
GAIN REF
Eθ
Eφ
RC
LC
OTHER AS NOTED UNDER REMARKS
COORDINATE REFERENCE
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
PSL № 131528
FIG 266
FREQUENCY 2288 MHz
ANTENNA SCH-1.7 Horn
REMARKS System Linearity Check

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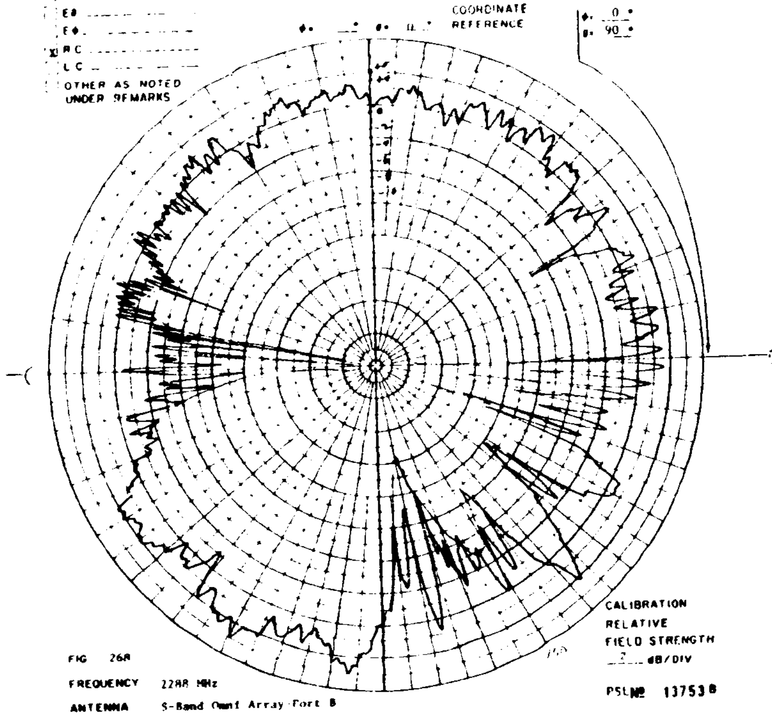
POLARIZATION
GAIN REF
Eθ
Eφ
☒ RC
LC
OTHER AS NOTED UNDER REMARKS

COORDINATE REFERENCE
φ = 0°
θ = 90°



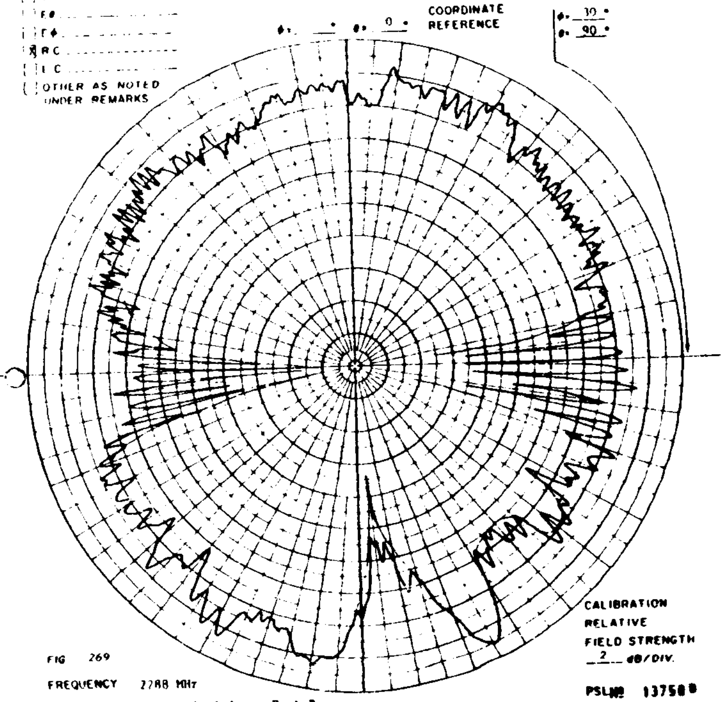
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV

PSL № 13753 B

FIG 268
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Array-Port B
REMARKS Solar Array (-Z)
High Gain Antenna (-Z)
Cooler Door Open

POLARIZATION
GAIN REF
Eθ
Eφ
☒ RC
LC
OTHER AS NOTED UNDER REMARKS

COORDINATE REFERENCE
φ = 30°
θ = 90°



CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.

PSL № 13758 B

FIG 269
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Array-Port B
REMARKS Solar Array (-Z)
High Gain Antenna (-Z)
Cooler Door Open

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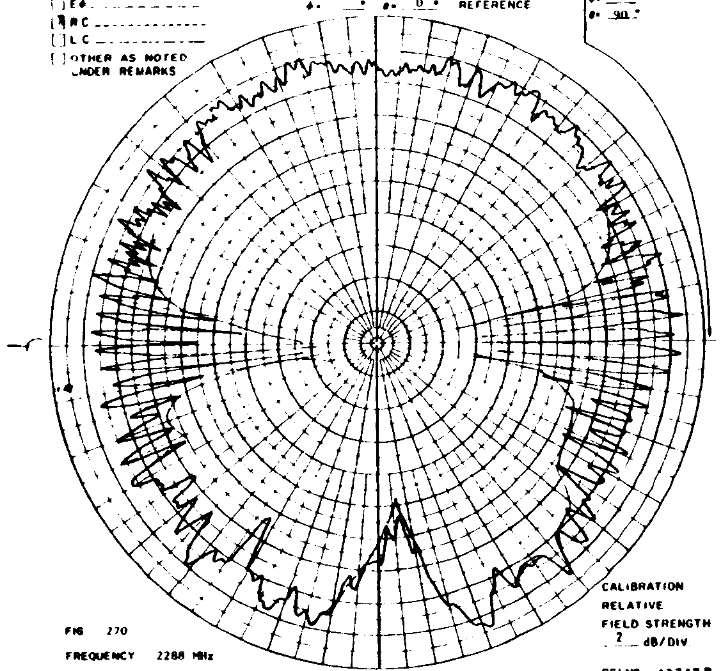
POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[X] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

φ = ___ ° θ = 0 ° COORDINATE REFERENCE φ = 60 ° θ = 90 °



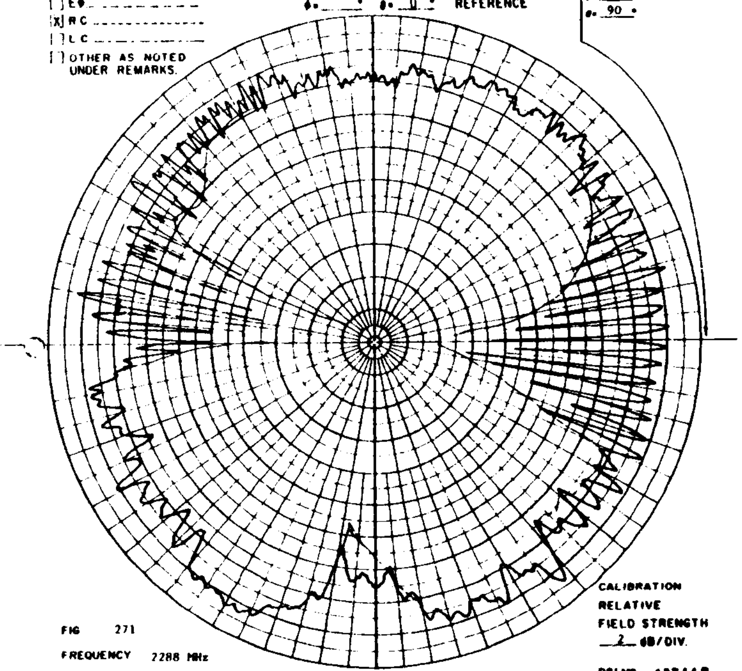
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV

FIG 270
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Array-Port B
REMARKS Solar Array (-Z)
High Gain Antenna (-Z)
Cooler Door Open

PSL № 13747 B

POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[X] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS.

φ = ___ ° θ = 0 ° COORDINATE REFERENCE φ = 90 ° θ = 90 °



CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.

FIG 271
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Array-Port B
REMARKS Solar Array (-Z)
High Gain Antenna (-Z)
Cooler Door Open

PSL № 13744 B

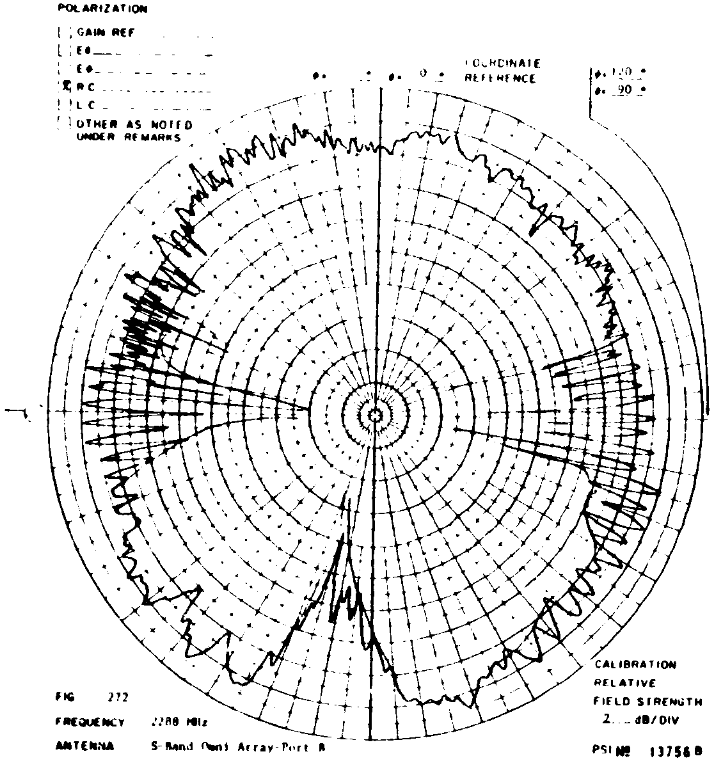


FIG 272
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Array-Port B
REMARKS Solar Array (-Z)
High Gain Antenna (-Z)
Cooler Door Open

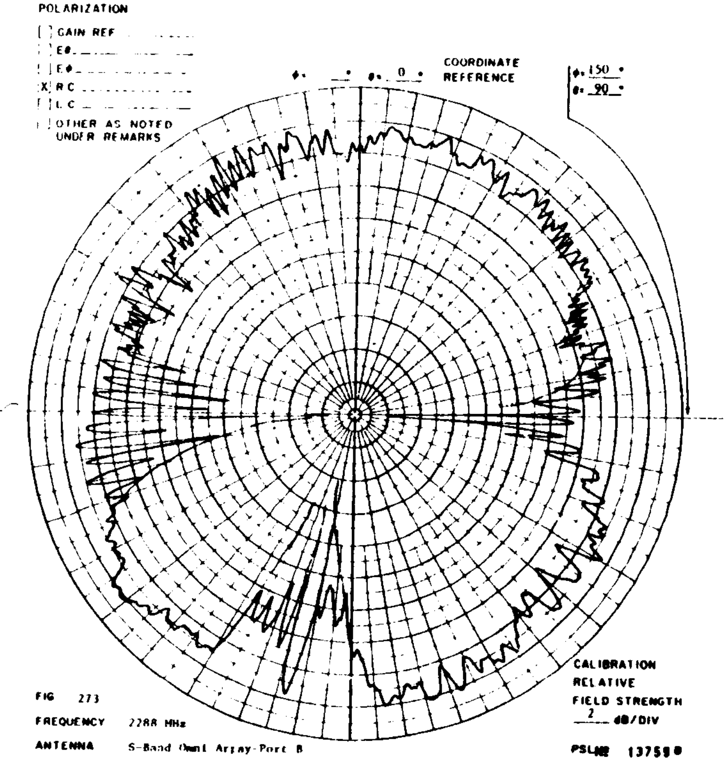


FIG 273
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Array-Port B
REMARKS Solar Array (-Z)
High Gain Antenna (-Z)
Cooler Door Open

12.18 S-Band Omni Unit Radiator No. 1 - On Earth Side of Mockup
Antenna Patterns - 2287.5 MHz - Solar Array (-X)

12.18.1 R.C. Polarization
High-Gain Antenna (-Z)
Antenna Range Leg Length - 3000 Feet

12.18.2 The omni array harness was disconnected and omni No. 1, which was mounted on the (+Z) side of the test vehicle was tested by itself. The Power Contour's Fig.'s 274 and 275 show the resulting radiation coverage in the twc hemispheres for this antenna element alone.

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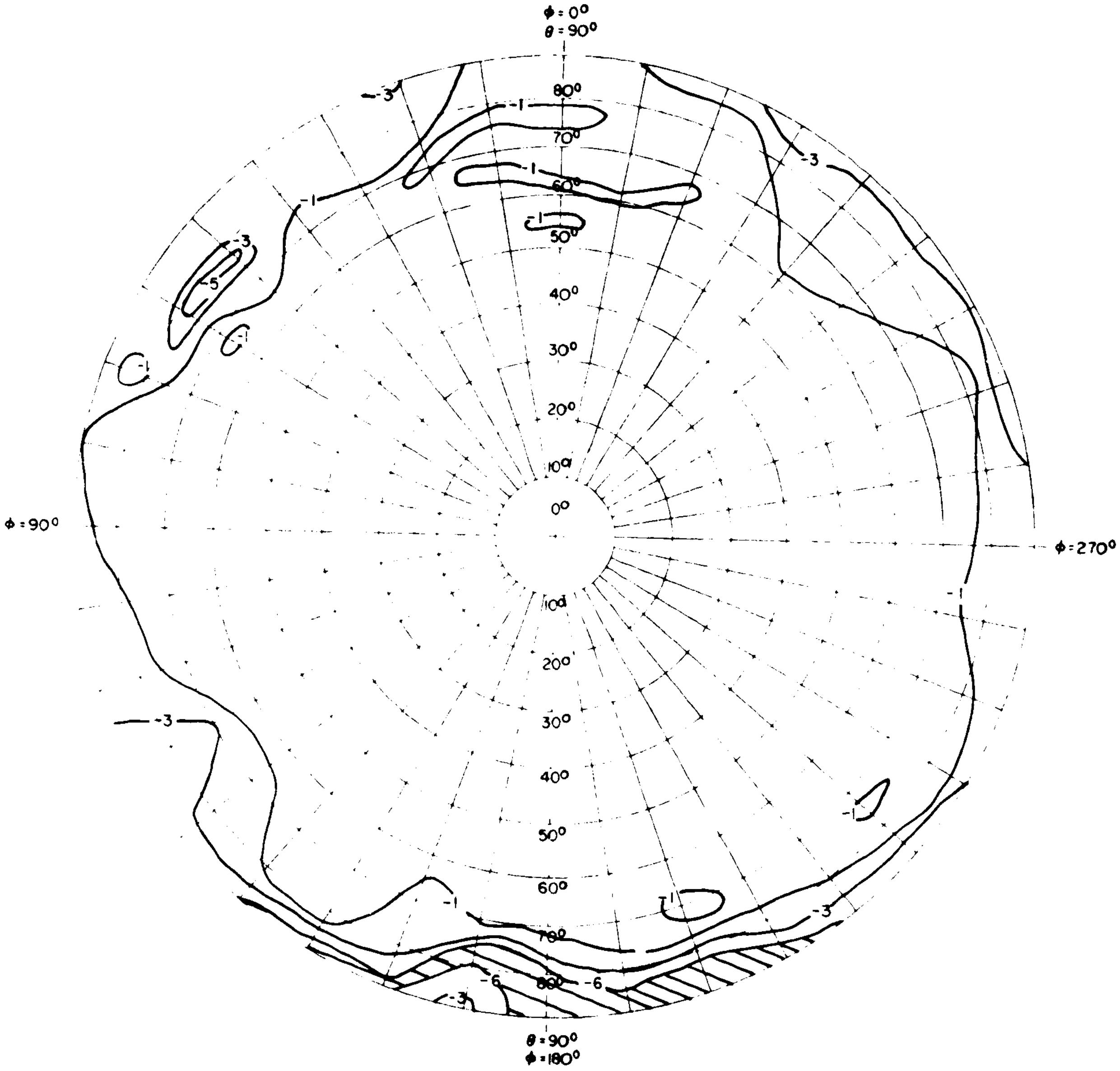


FIG. NO. 274 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT-D	POLARIZATION	R.C.
ANTENNA	OMNI UNIT NO. 1	GAIN REFERENCE	SGH 1.7 HORN
FREQUENCY	2288 MHz	ENGINEER	C.C. Post
MODEL SCALE	FULL	GAIN TO ANT. INPUT	
REMARKS			
SOLAR PANEL (-X)			
HIGH GAIN ANTENNA (-Z)			
LOWER HEMISPHERE			

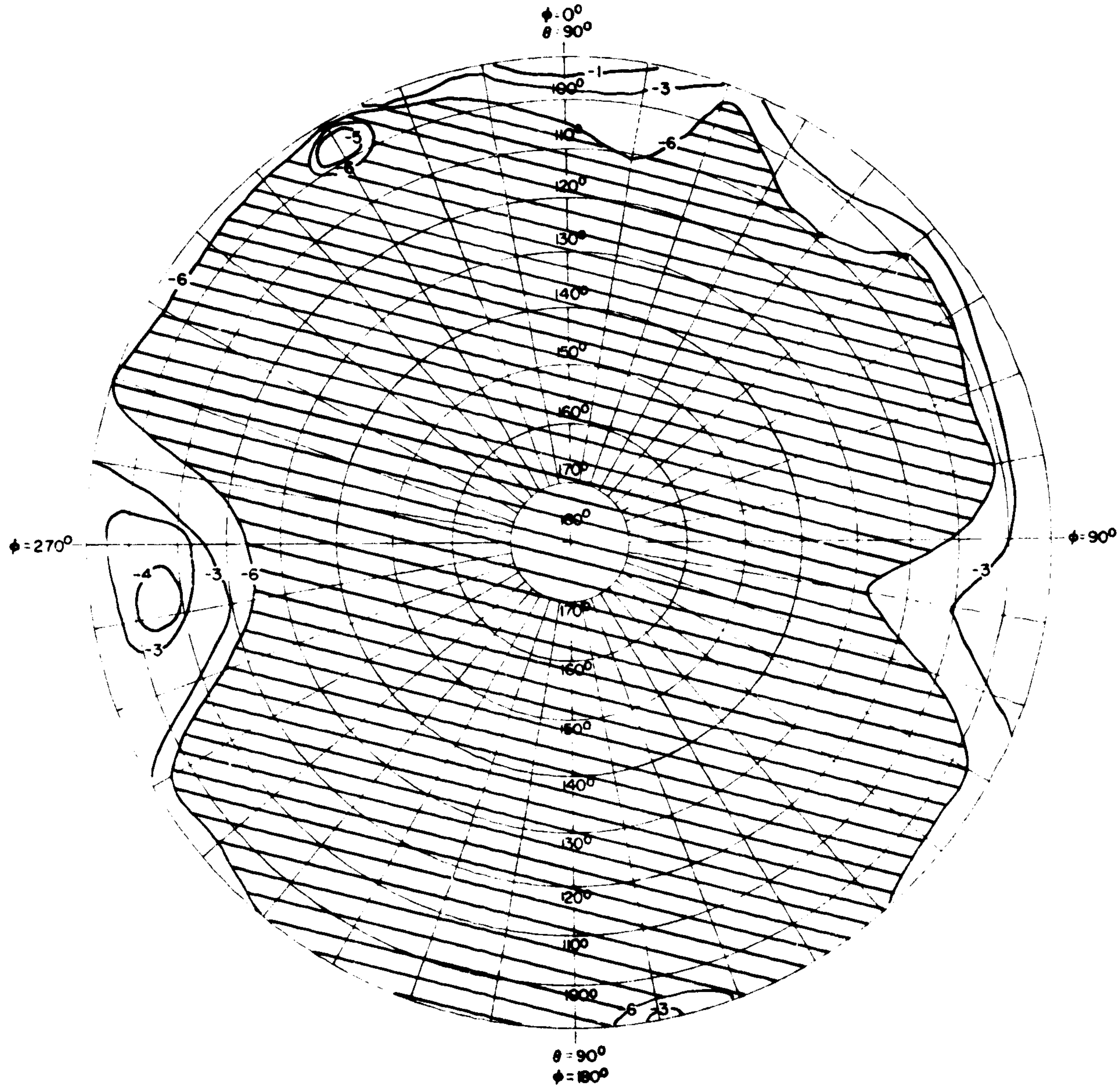
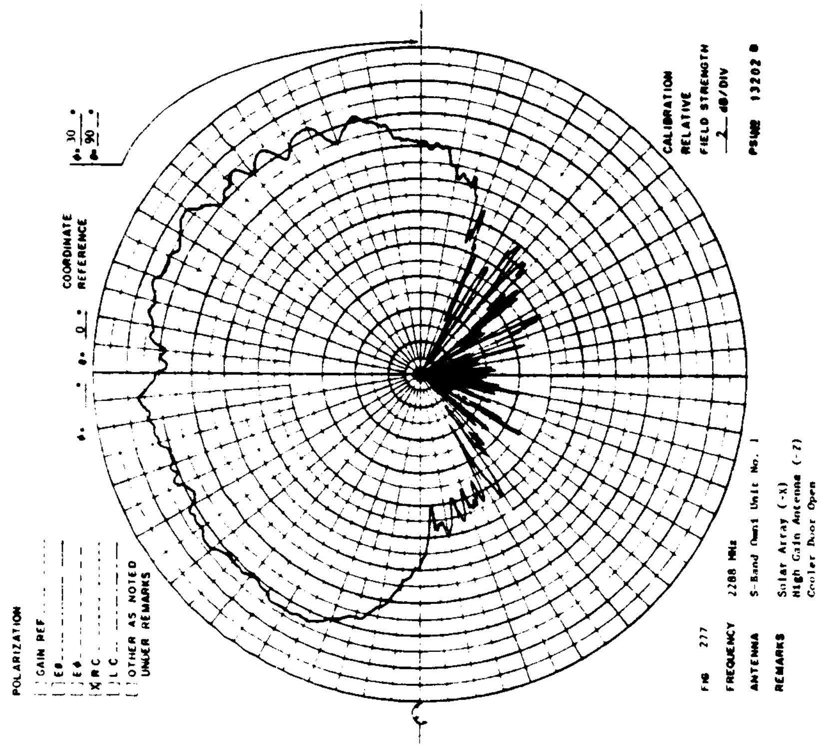
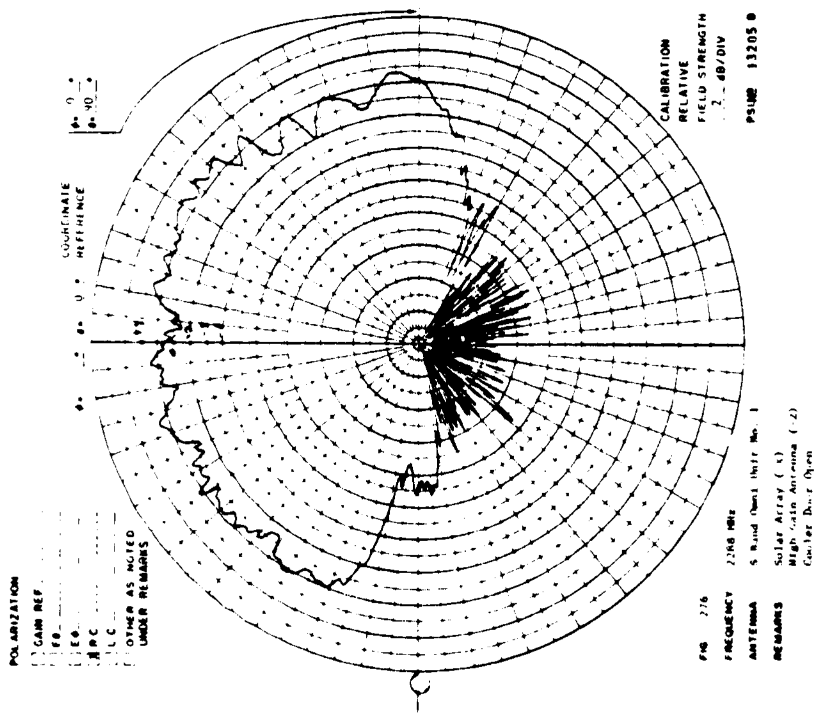


FIG. NO. 275 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT D	POLARIZATION	R.C.
ANTENNA	OMNI UNIT NO. 1	GAIN REFERENCE	SGH 1.7 HORN
FREQUENCY	2288 MHz	ENGINEER	C. C. Post
MODEL SCALE	FULL	GAIN TO ANT. INPUT	
REMARKS			
	SOLAR PANEL (-X)		
	HIGH-GAIN ANTENNA (-Z)		
	UPPER HEMISPHERE		


POLARIZATION
GAIN REF.
Eθ
Eφ
RC
LC
OTHER AS NOTED
UNDER REMARKS
COORDINATE
REFERENCE
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
13202 B
FIG 277
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Unit No. 1
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Open


POLARIZATION
GAIN REF.
Eθ
Eφ
RC
LC
OTHER AS NOTED
UNDER REMARKS
COORDINATE
REFERENCE
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
13205 B
FIG 276
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Unit No. 1
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Open

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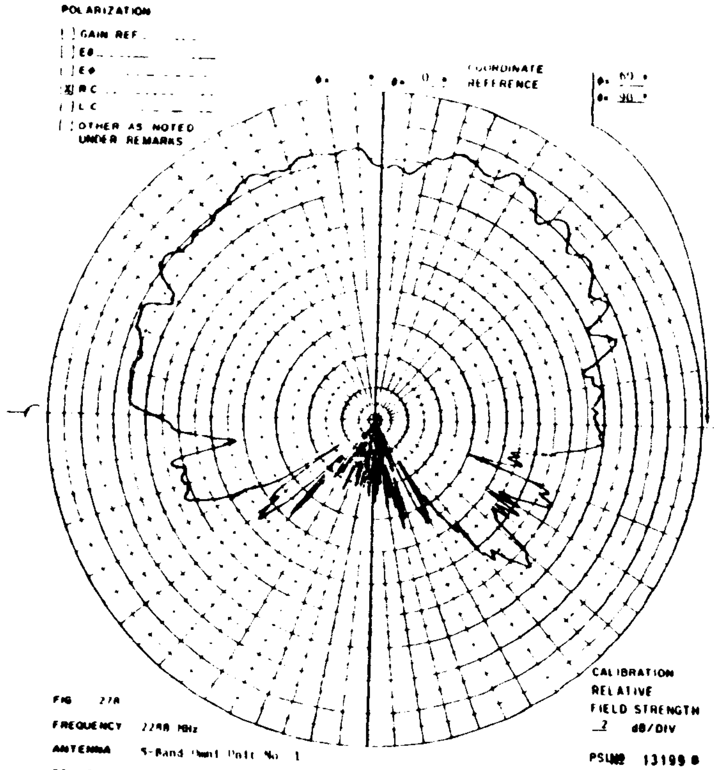

FIG 278
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Unit No. 1
REMARKS Solar Array (-x)
High Gain Antenna (-z)
Cooler Door Open

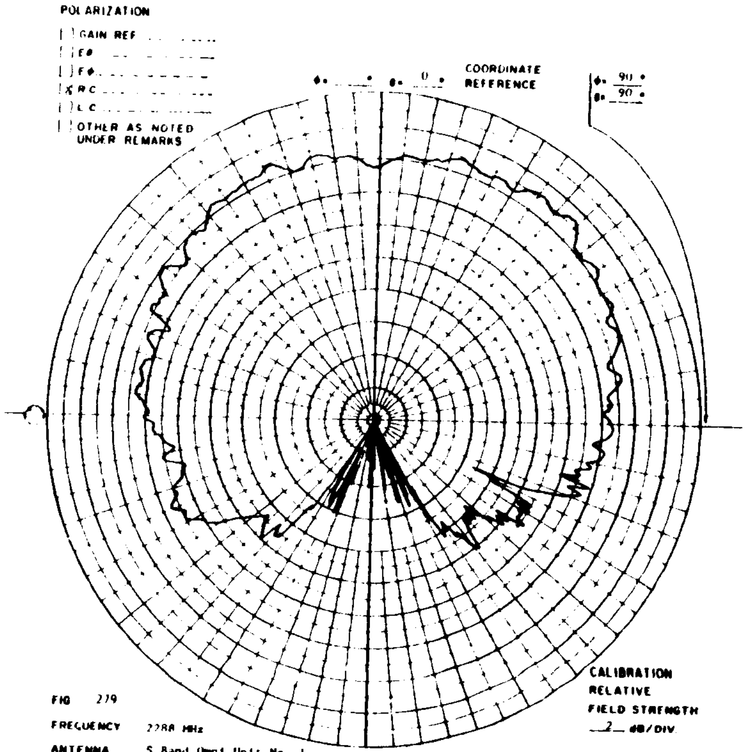

FIG 279
FREQUENCY 2288 MHz
ANTENNA S Band Omni Unit No. 1
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Open

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POLARIZATION
GAIN REF
Eθ
Eφ
X RC
LC
OTHER AS NOTED UNDER REMARKS

COORDINATE REFERENCE
θ = 120°
φ = 90°

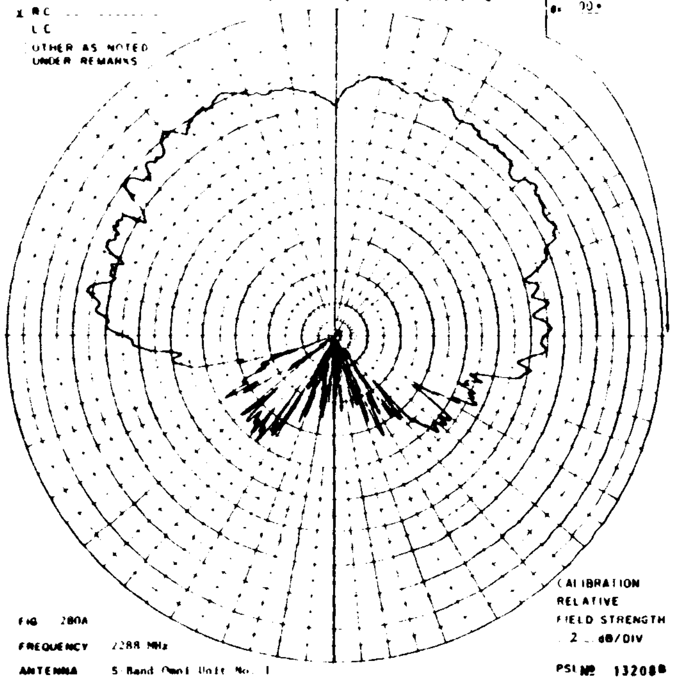

FIG 280A
FREQUENCY 2288 MHz
ANTENNA S Band Omni Unit No. 1
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Open

CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
PSL № 132088

POLARIZATION
GAIN REF
Eθ
Eφ
X RC
LC
OTHER AS NOTED UNDER REMARKS

φ = 0°
COORDINATE REFERENCE
θ = 150°
φ = 90°

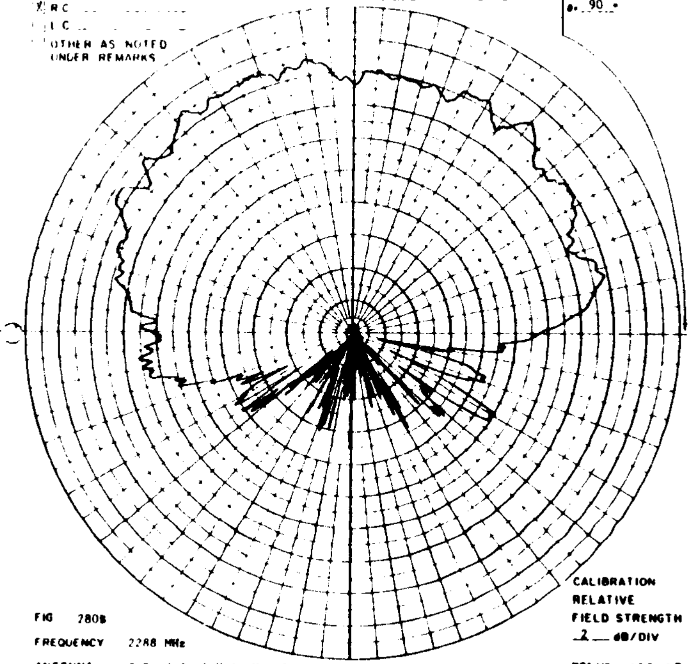

FIG 280B
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Unit No. 1
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Open

CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
PSL № 132118

12.19 S-Band Omni Unit Radiator No. 2 - On Sky Side of Mockup Antenna Patterns - 2287.5 MHz - Solar Array (-X)

12.19.1 R.C. Polarization
High-Gain Antenna (-Z)
Antenna Range Leg Length - 3000 Feet

12.19.2 The omni array harness was disconnected and the unit radiator No. 2 was examined by itself. The contour plots on Fig.'s 281 and 282 show results.

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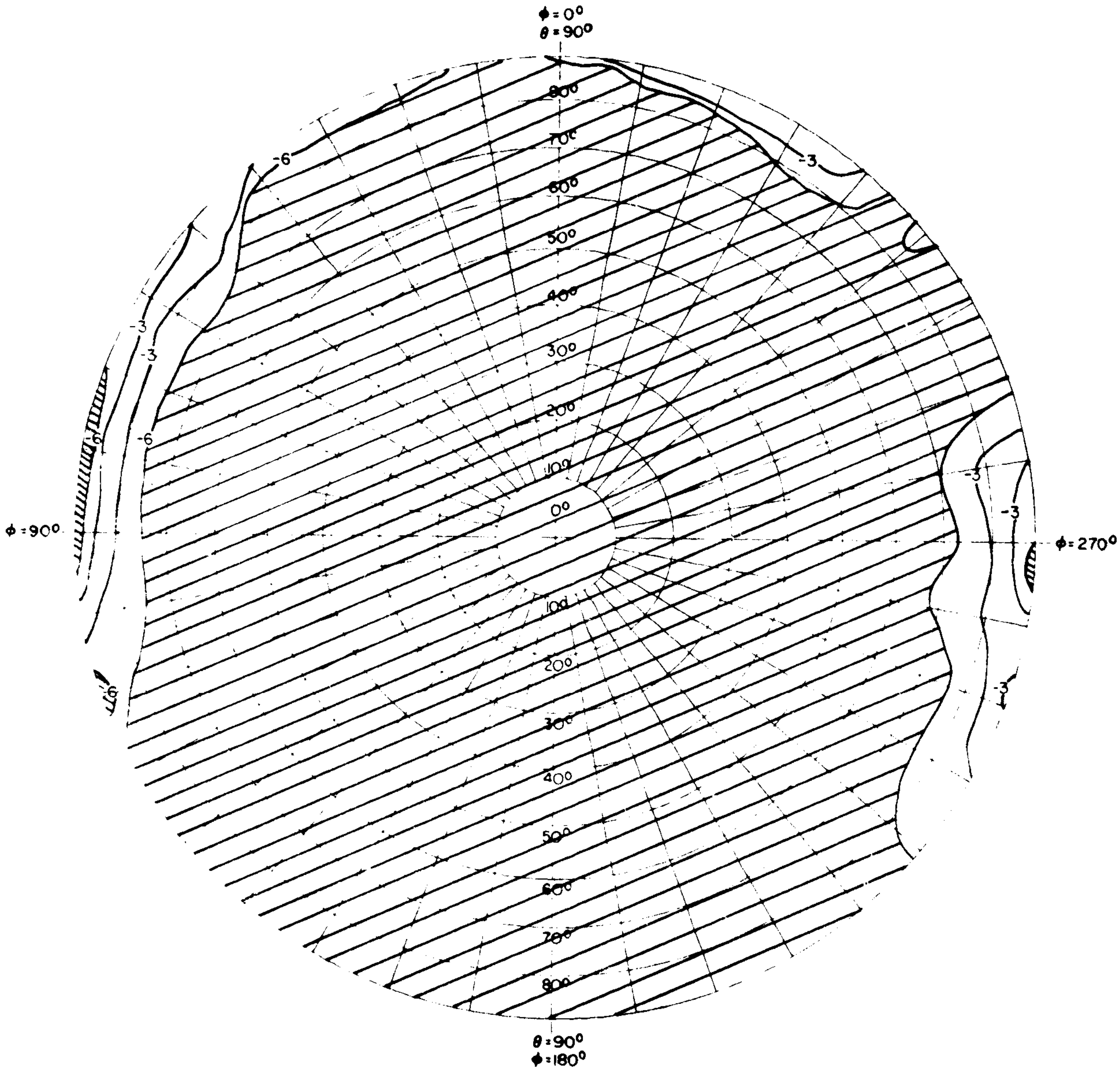


FIG. NO. 281 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT D	**POLARIZATION**	R.C.
ANTENNA	OMNI UNIT NO. 2	**GAIN REFERENCE**	SGH 1.7 HORN
FREQUENCY	2288 MHz	**ENGINEER**	C.C. Post
MODEL SCALE	FULL	GAIN TO ANT. INPUT	
REMARKS			
	SOLAR PANEL (-X)		
	HIGH GAIN ANTENNA (-Z)		
	LOWER HEMISPHERE		

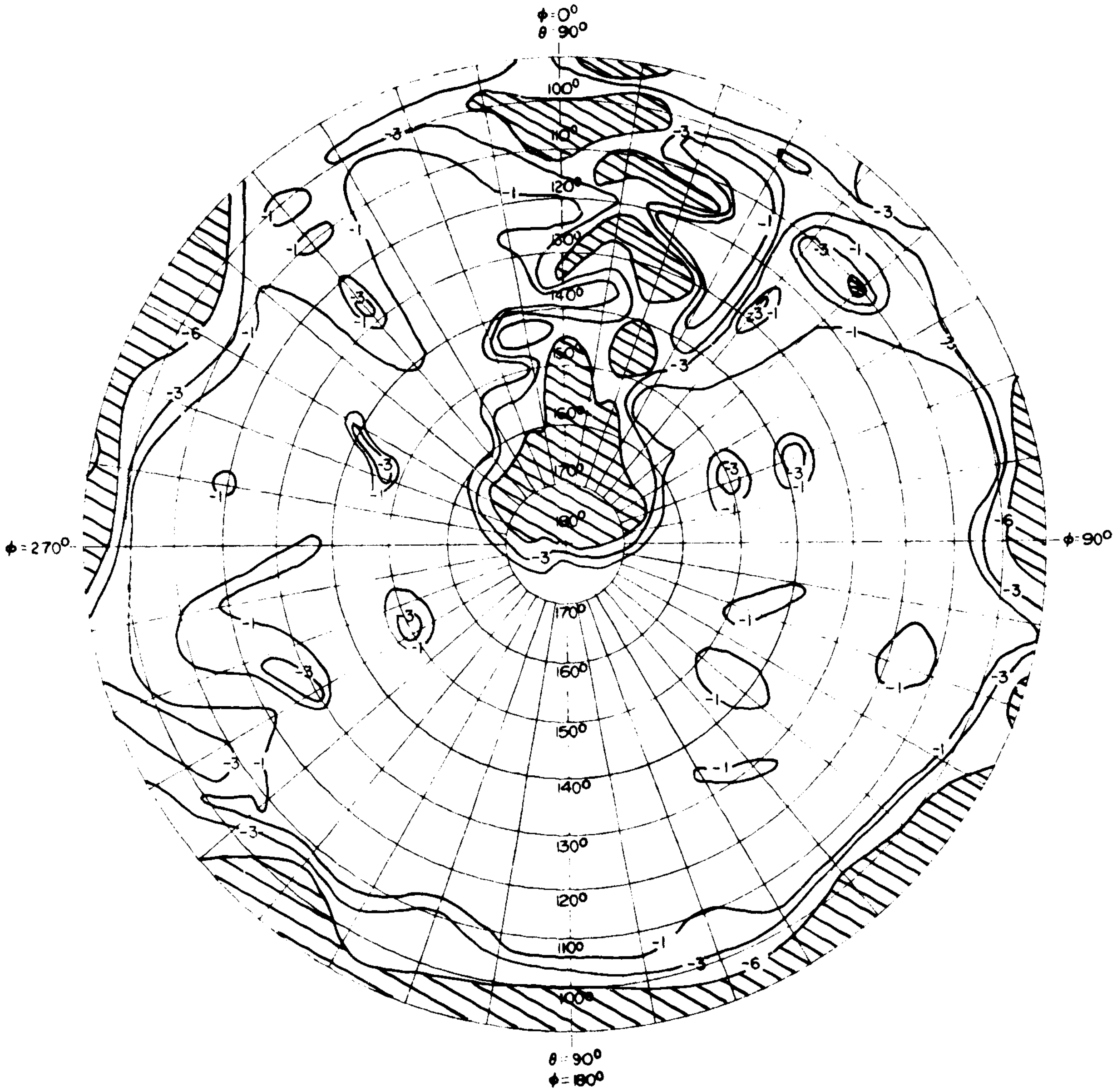


FIG. NO. 282 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT D	POLARIZATION	R.C.
ANTENNA	OMNI UNIT NO. 2	GAIN REFERENCE	SGH 1.7 HORN
FREQUENCY	2288 MHz	ENGINEER	C.C. Post
MODEL SCALE	FULL	GAIN TO ANT. INPUT	
REMARKS			
	SOLAR PANEL (-X)		
	HIGH GAIN ANTENNA (-Z)		
	UPPER HEMISPHERE		

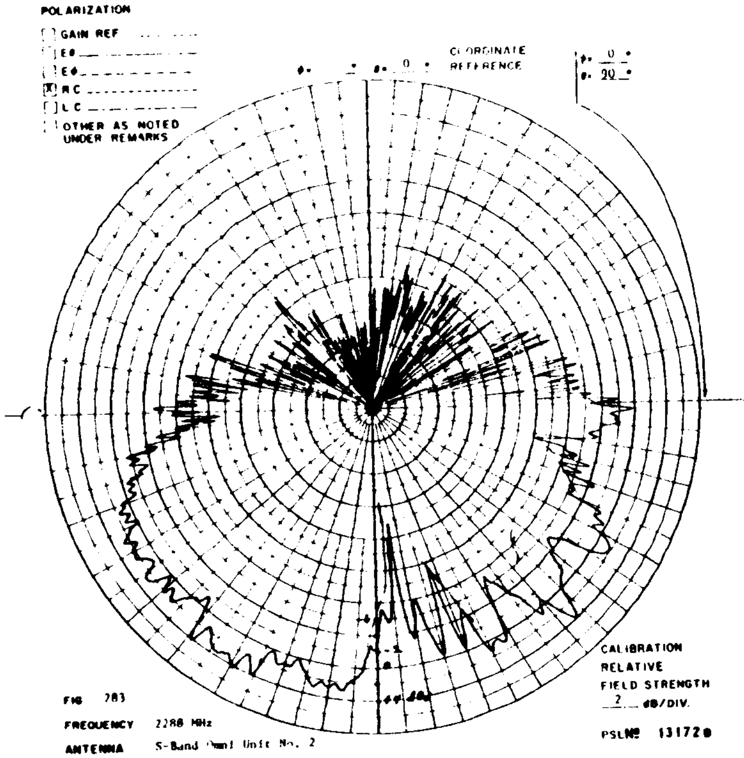


FIG 283
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Unit No. 2
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Open

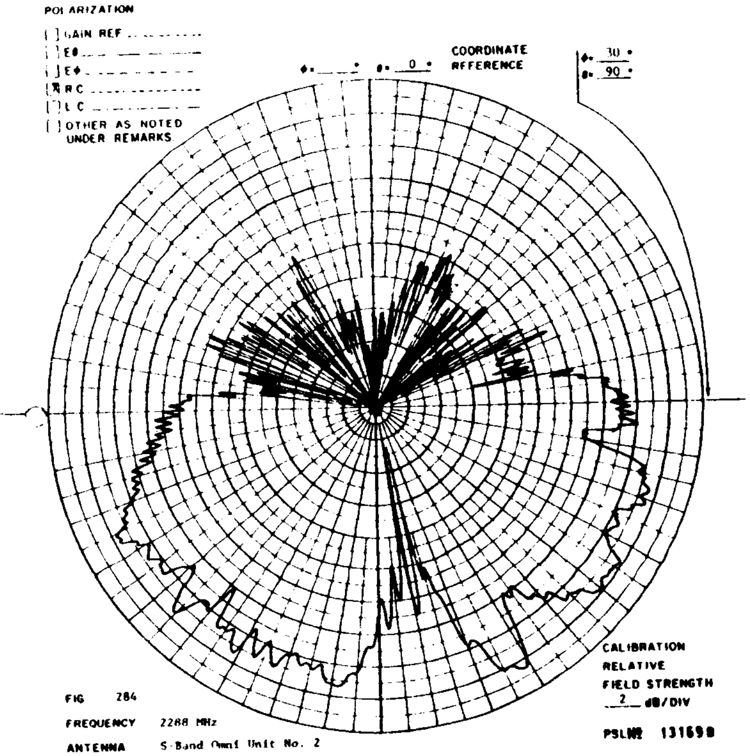
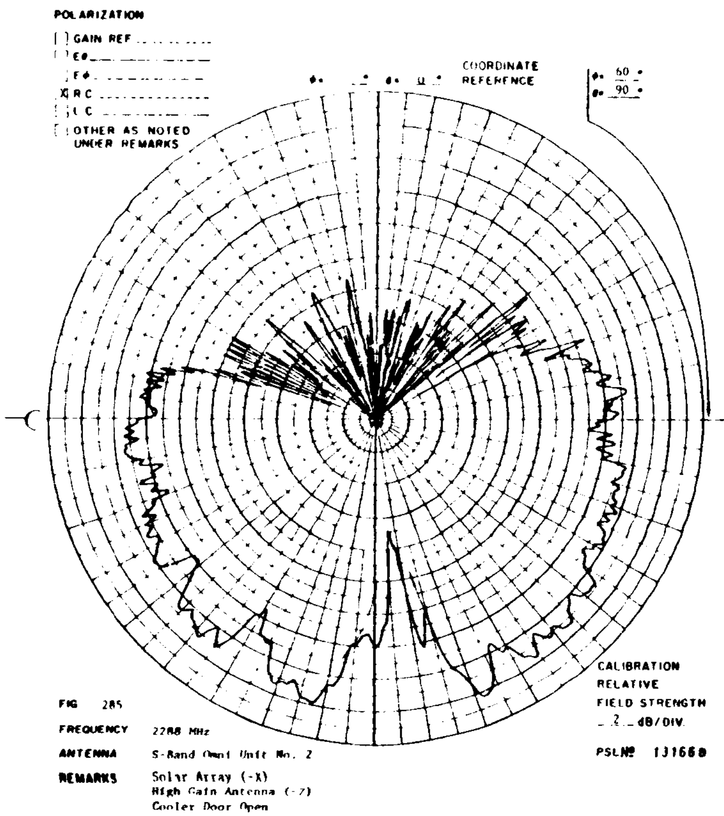
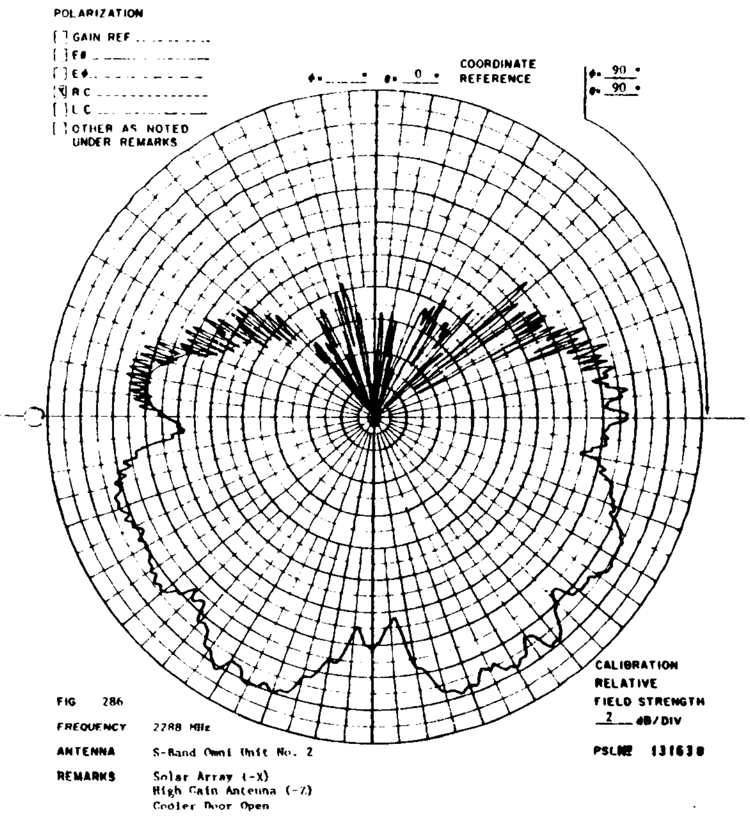


FIG 284
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Unit No. 2
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Open


POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[X] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS
COORDINATE REFERENCE
φ= 60 °
θ= 90 °
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.
PSL№ 131660
FIG 285
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Unit No. 2
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Open


POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[X] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS
θ= 0 °
COORDINATE REFERENCE
φ= 90 °
θ= 90 °
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
PSL№ 131630
FIG 286
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Unit No. 2
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Open

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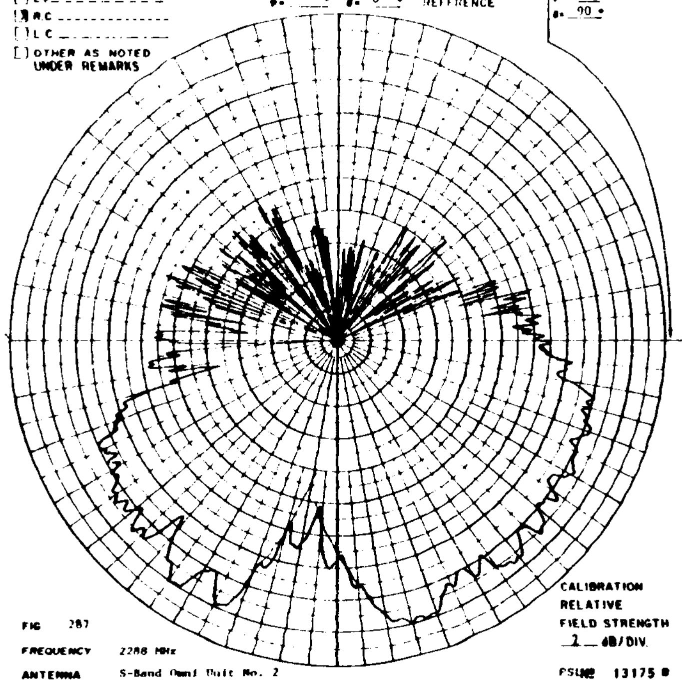

FIG 287
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Unit No. 2
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door O–

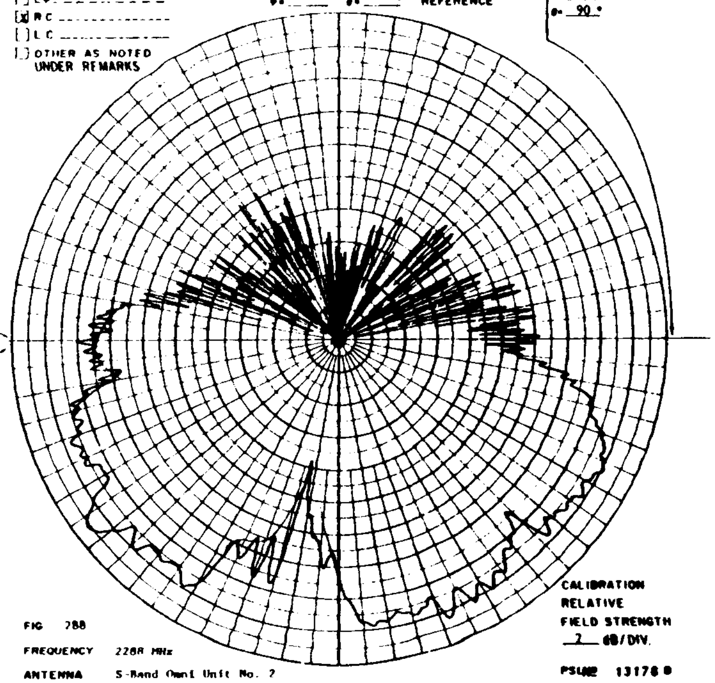

FIG 288
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Unit No. 2
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
Cooler Door Open

12.20 S-Band Omni Unit Radiator No. 3 - Antenna - First Option Antenna Patterns - 2287.5 MHz - Solar Array (-X)

12.20.1 R.C. Polarization
High-Gain Antenna (-Z)
Antenna Range Leg Length - 3000 Feet

12.20.2 This unit radiator was mounted near the (+X) end of the test vehicle on the (+Y) side.

12.20.3 The purpose of this test was to investigate the use of a radiator to supplement the omni array antenna for pattern coverage near the $\theta = 90°$ region. The interference lobe structure always present for the omni array in the $\theta = 90°$ region of the pattern might be filled by a single unit antenna. The results are shown on Fig.'s 289 and 290.

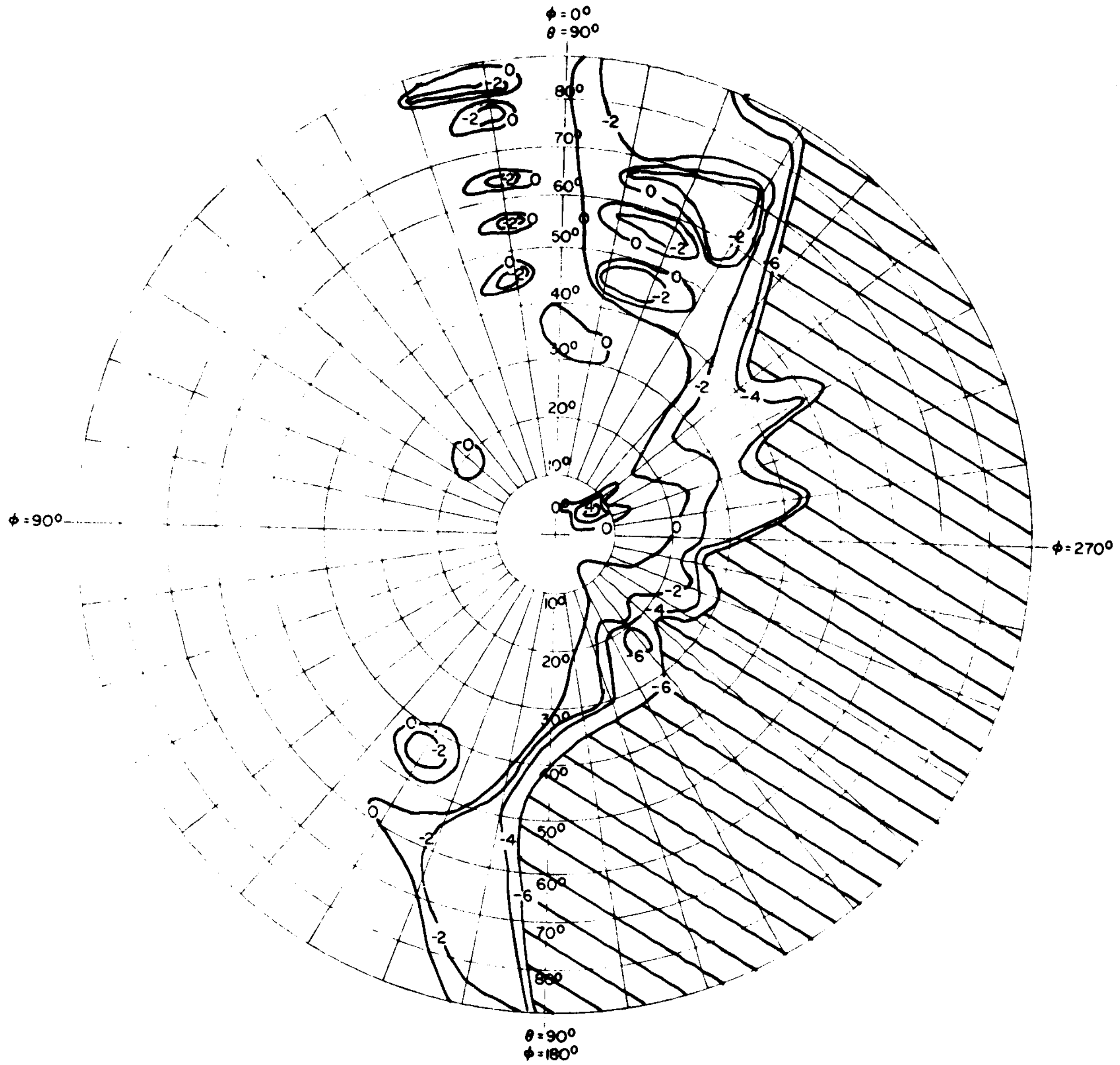

FIG. NO. 289 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT-D	POLARIZATION	R.C.
ANTENNA	OMNI No. 3	GAIN REFERENCE	SGH 1.7 HORN
FREQUENCY	2288 MHz	ENGINEER	C.C. Post
MODEL SCALE	FULL	ANTENNA LOCATION	FIRST OPTION
REMARKS			
	SOLAR ARRAY (-X)		
	HIGH-GAIN ANTENNA (-Z)		
	EARTH VIEW HEMISPHERE		

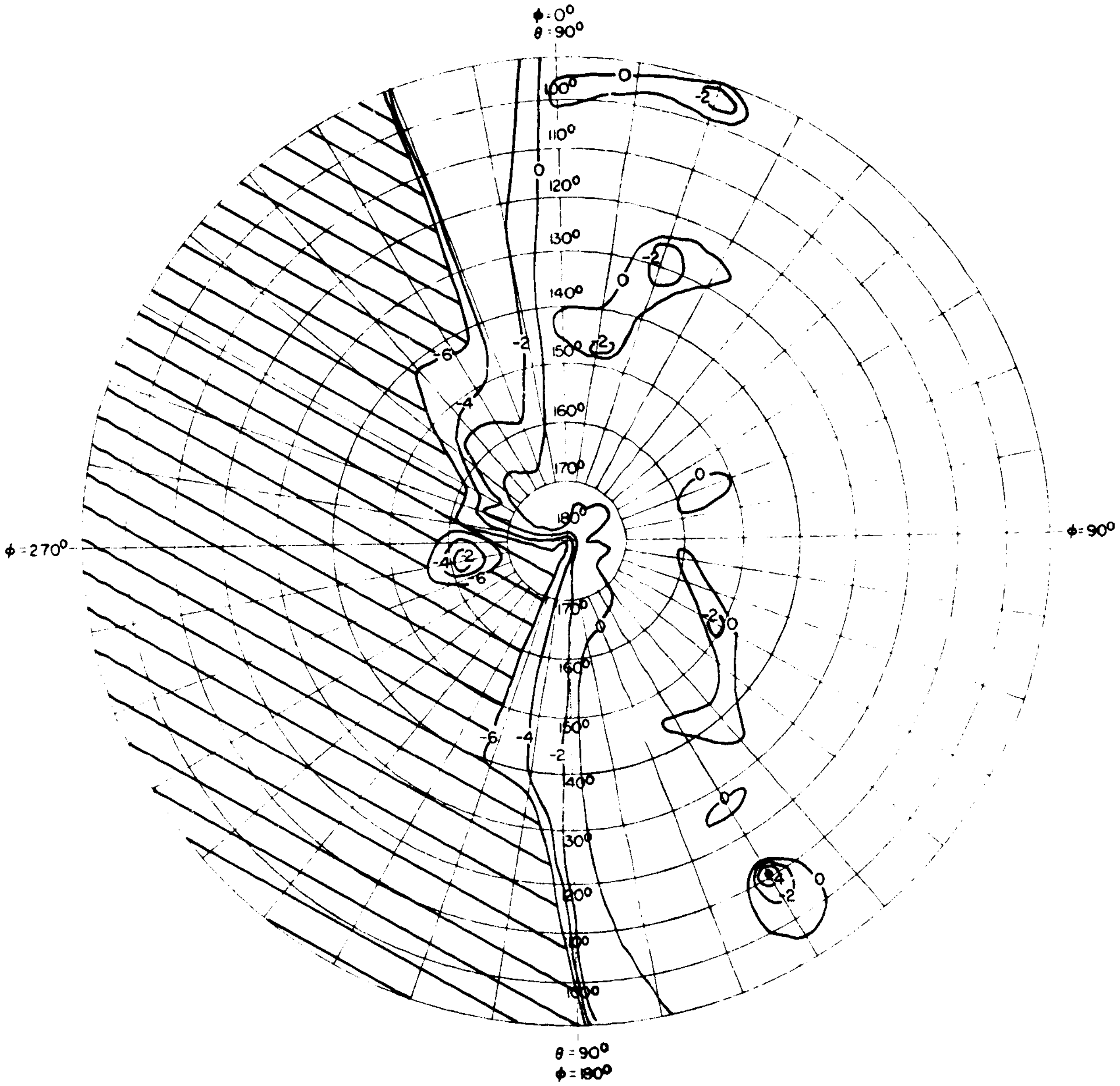

FIG. NO. 290 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT D	POLARIZATION	R.C.
ANTENNA	OMNI No. 4	GAIN REFERENCE	SGH 1.7 HORN
FREQUENCY	2288 MHz	ENGINEER	C.C. Post
MODEL SCALE	FULL	ANTENNA LOCATION	FIRST OPTION
REMARKS			
	SOLAR ARRAY (-X)		
	HIGH GAIN ANTENNA (-Z)		
	UPPER HEMISPHERE		

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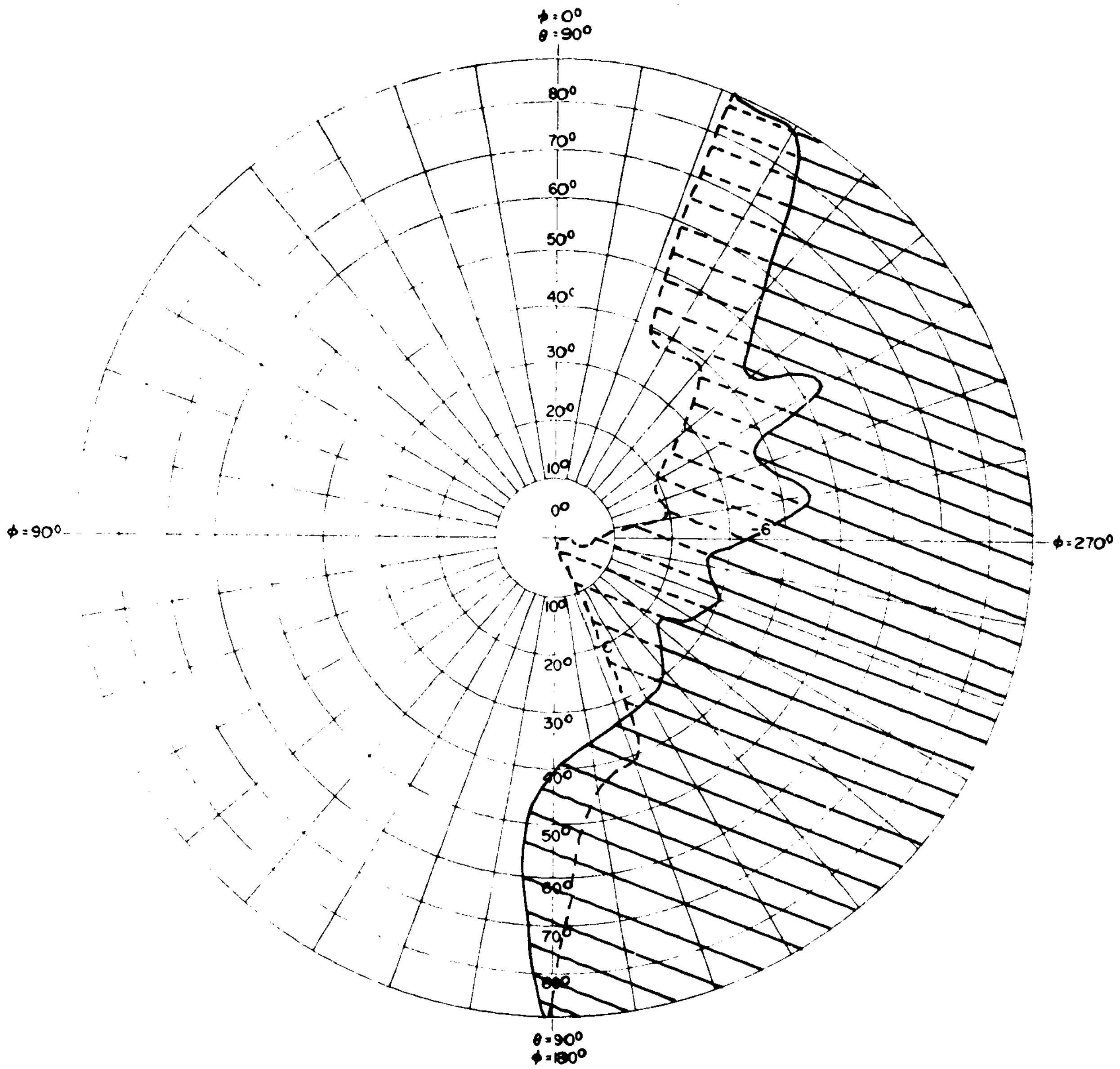
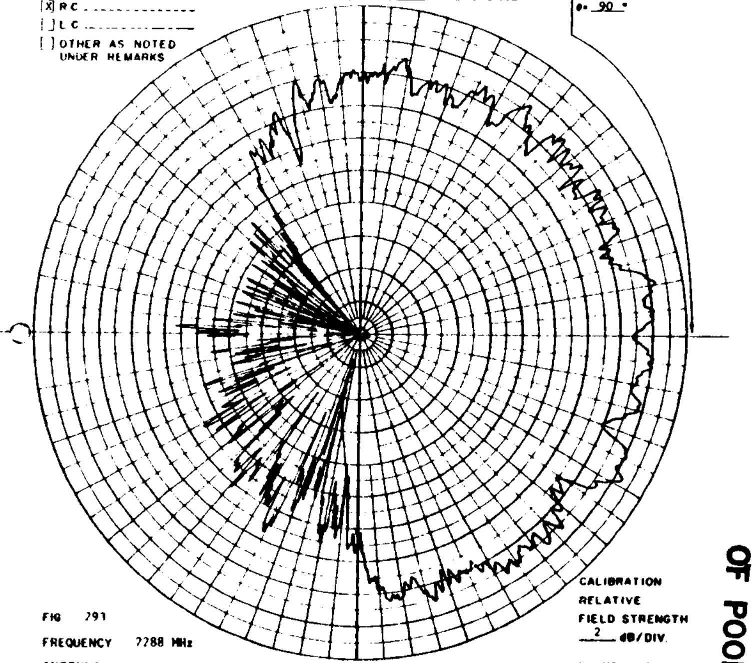


FIG. NO. 291 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT D	POLARIZATION	R.C.
ANTENNA	OMNI NO. 3	GAIN REFERENCE	SGH-L.7 HORN
FREQUENCY	2288 MHz	ENGINEER	C.C. Post
MODEL SCALE	FULL	ANTENNA LOCATION	FIRST OPTION
REMARKS	SOLAR ARRAY (-X) - HIGH-GAIN ANTENNA (-Z)		
	Super position of the upper and lower hemispheres		
	with only data (-6) dB and lower plotted and shaded. The dashed		
	contour shows the upper hemisphere data. (See Figures 289 and 290.)		

POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[X] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

COORDINATE REFERENCE θ = ___° φ = 0° | θ = 30° φ = 90°



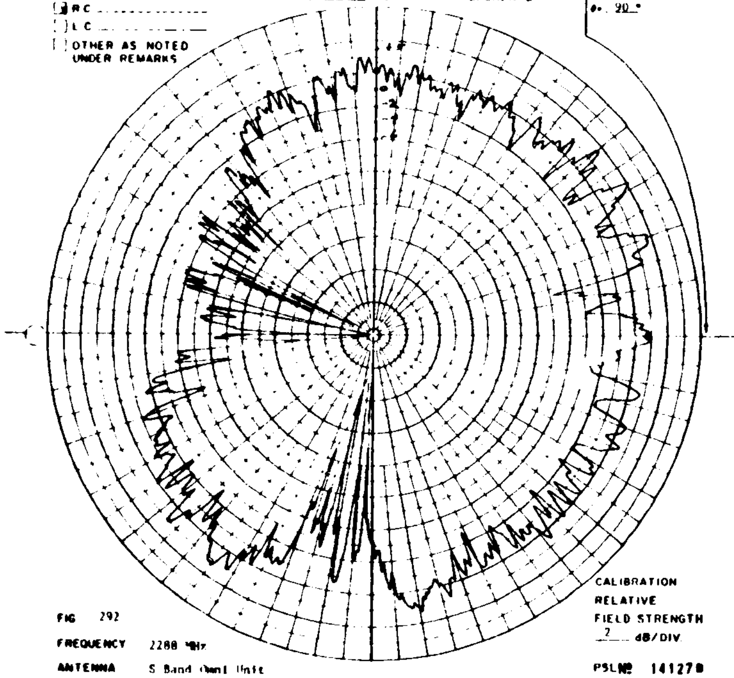
CALIBRATION
RELATIVE FIELD STRENGTH 2 dB/DIV.

PSL№ 141248

FIG 291
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Unit No. 3 Option No. 1
REMARKS Solar Array (-X)
High Gain Antenna (-Z)

POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[X] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

COORDINATE REFERENCE θ = ___° φ = 0° | θ = 0° φ = 90°



CALIBRATION
RELATIVE FIELD STRENGTH 2 dB/DIV.

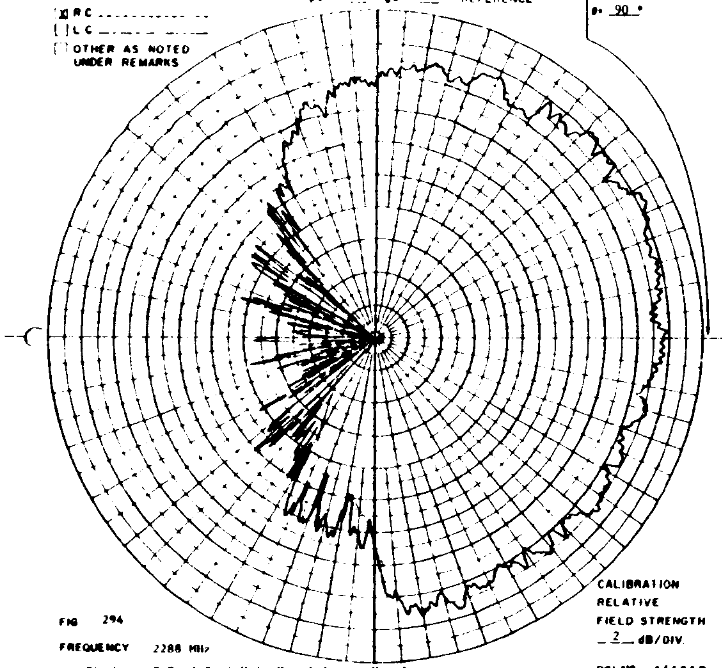
PSL№ 141270

FIG 292
FREQUENCY 2288 MHz
ANTENNA S Band Omni Unit No. 3 Option No. 1
REMARKS Solar Array (-X)
High Gain
Antenna (-Z)

POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[X] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

θ = __ ° φ = 0 ° COORDINATE REFERENCE

φ = 60 °
θ = 90 °



CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.

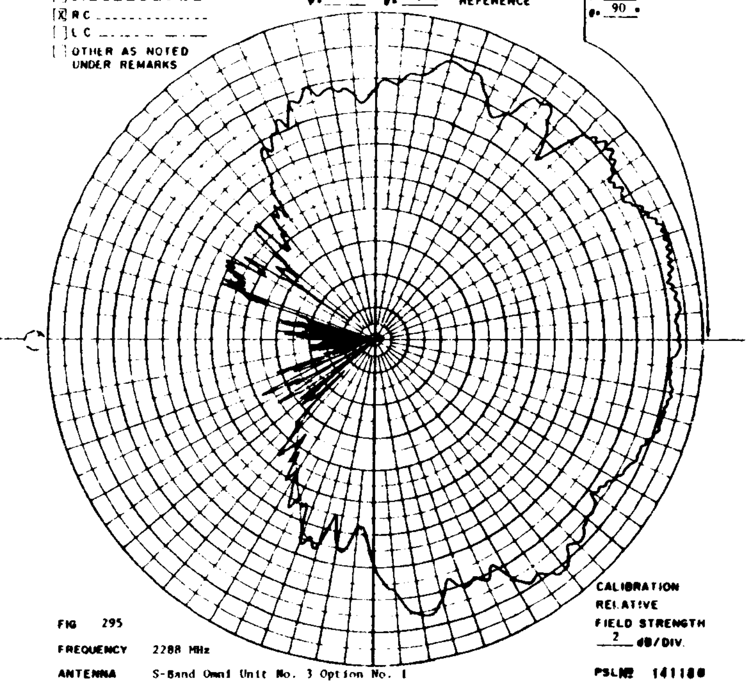
PSL№ 141210

FIG 294
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Unit No. 3 Option No. 1
REMARKS Solar Array (-X)
High Gain Antenna (-Z)

POLARIZATION
[ ] GAIN REF
[ ] Eθ
[ ] Eφ
[X] RC
[ ] LC
[ ] OTHER AS NOTED UNDER REMARKS

θ = __ ° φ = 0 ° COORDINATE REFERENCE

φ = 90 °
θ = 90 °



CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.

PSL№ 141180

FIG 295
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Unit No. 3 Option No. 1
REMARKS Solar Array (-X)
High Gain Antenna (-Z)

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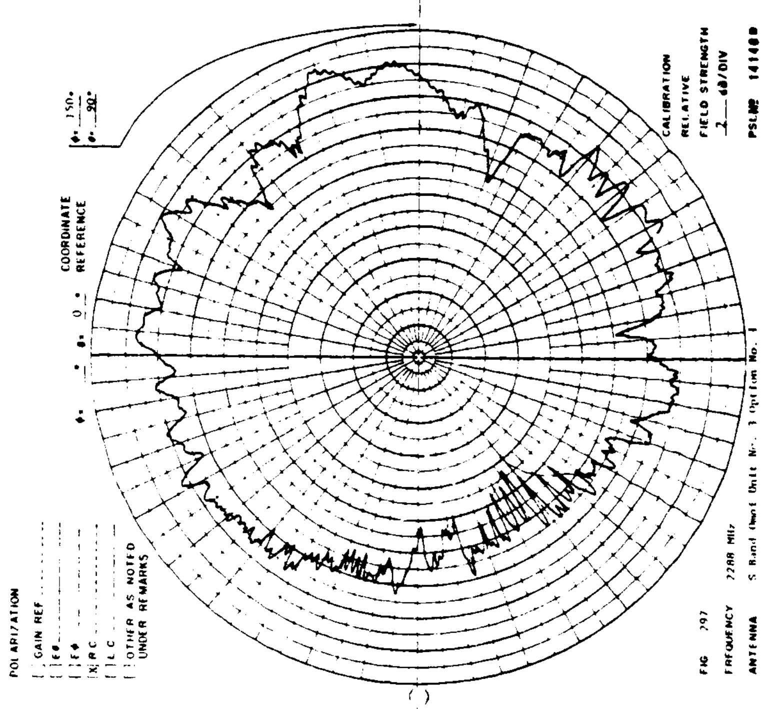

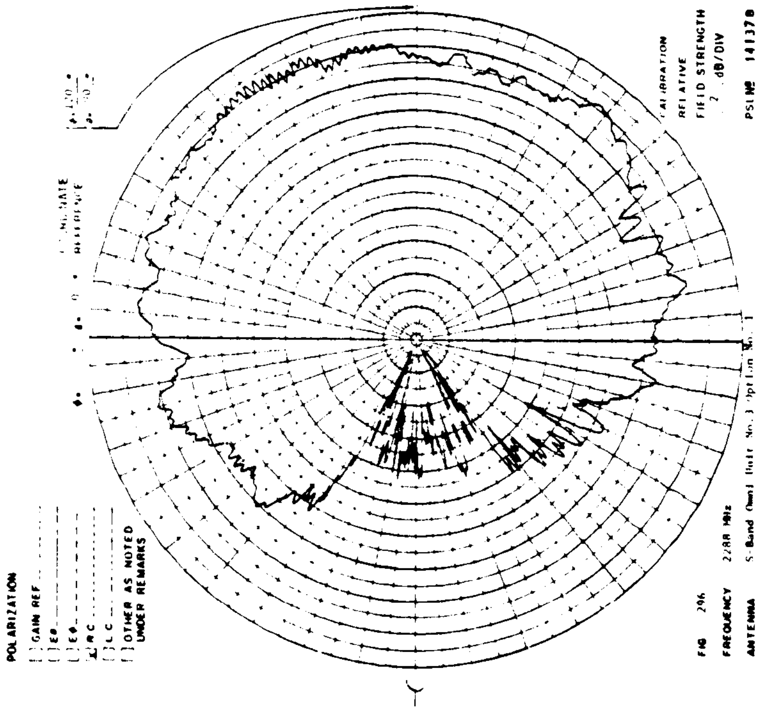

12.21 S-Band Omni Unit Radiator No. 3 - Antenna - Second Option Antenna Patterns - 2287.5 MHz - Solar Array (-X)

12.21.1 R.C. Polarization High-Gain Antenna (-Z)

12.21.2 This unit radiator was mounted on the High-Gain Antenna boom opposite the GPS Antenna.

12.21.3 The purpose of this test was similar to omni No. 3 - First Option described in Section 12.20.2 where it was desired to supplement the omni array antenna pattern coverage in the θ = 90° region of the array with coverage by a separate unit radiator.

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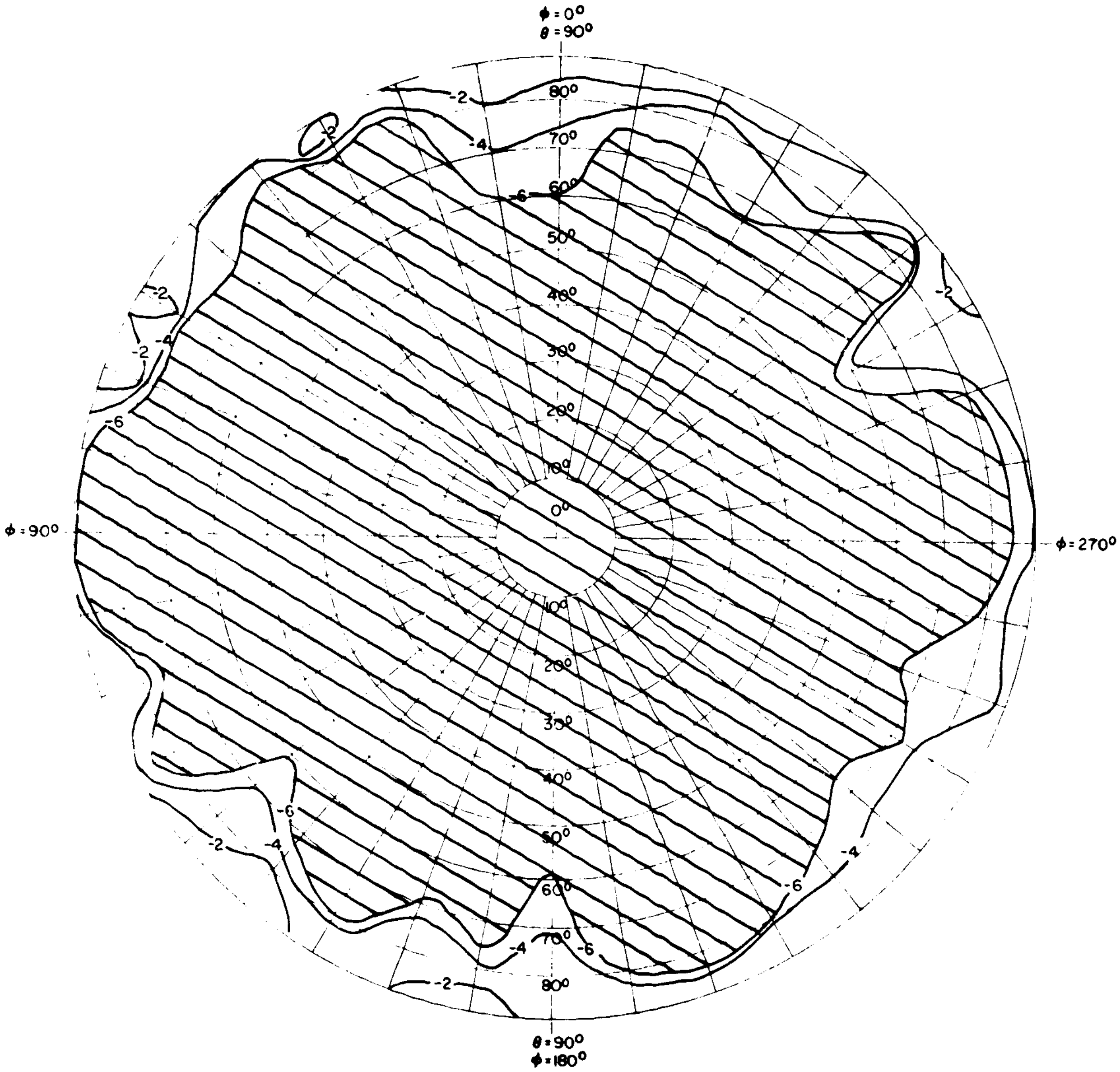

FIG. NO. 299 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT - D	**POLARIZATION**	R. C.
ANTENNA	OMNI No. 3	**GAIN REFERENCE**	SGH 1.7 HORN
FREQUENCY	2288 MHz	**ENGINEER**	C. C. Post
MODEL SCALE	FULL	ANTENNA POSITION	SECOND OPTION
REMARKS	LOWER HEMISPHERE		
	SOLAR PANEL (-X)		
	HIGH-GAIN ANTENNA (-Z)		
	MOUNTED ON HIGH-GAIN ANTENNA BOOM		

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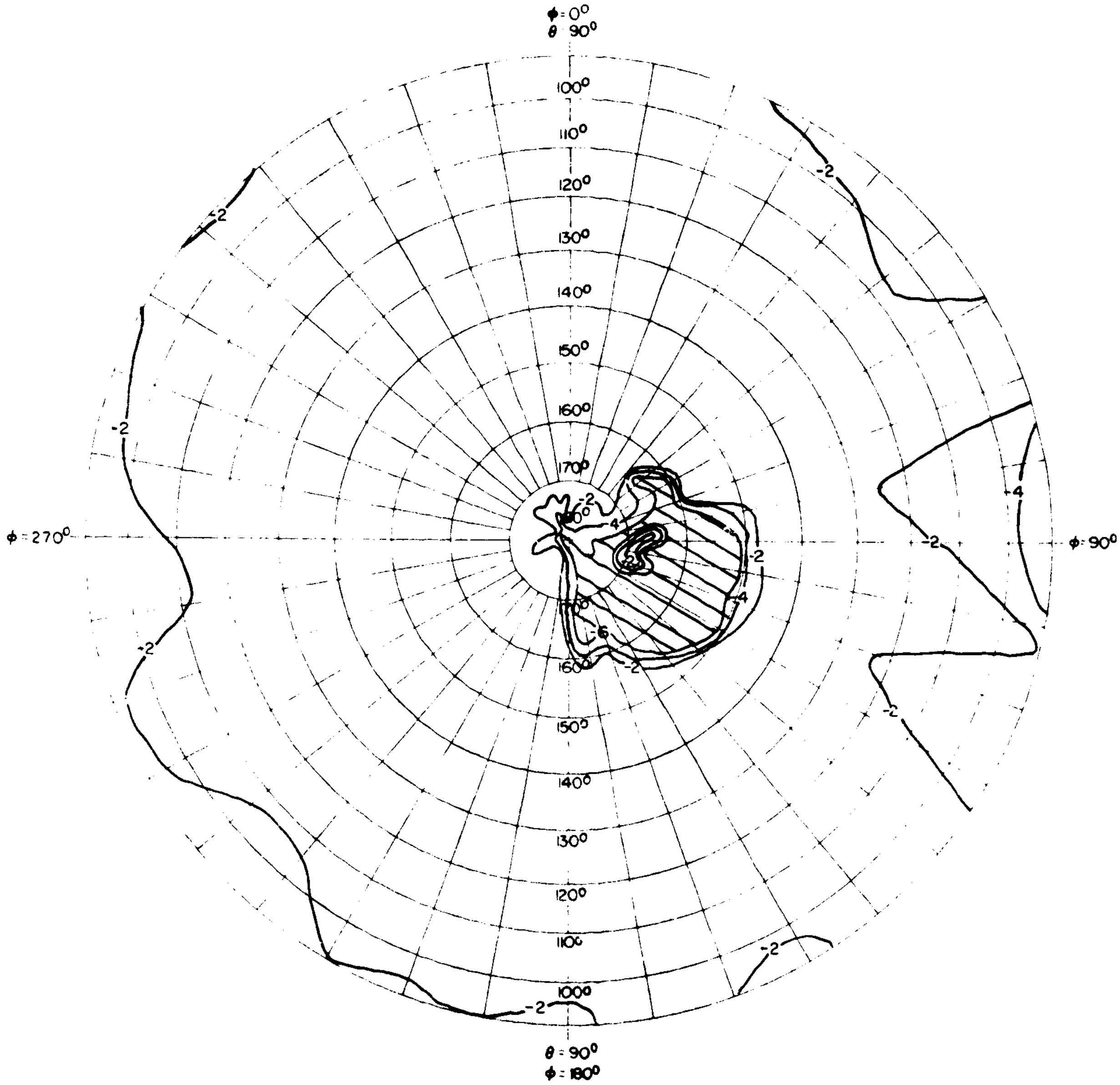


FIG. NO. 300 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT D	POLARIZATION	R.C.
ANTENNA	OMNI No. 3	GAIN REFERENCE	SGH 1.7 HORN
FREQUENCY	2288 MHz	ENGINEER	C.C. Post
MODEL SCALE	FULL	ANTENNA POSITION	SECOND OPTION
REMARKS	UPPER HEMISPHERE		
	SOLAR PANEL (X)		
	HIGH-GAIN ANTENNA (Z)		
	MOUNTED ON HIGH GAIN ANTENNA BOOM		

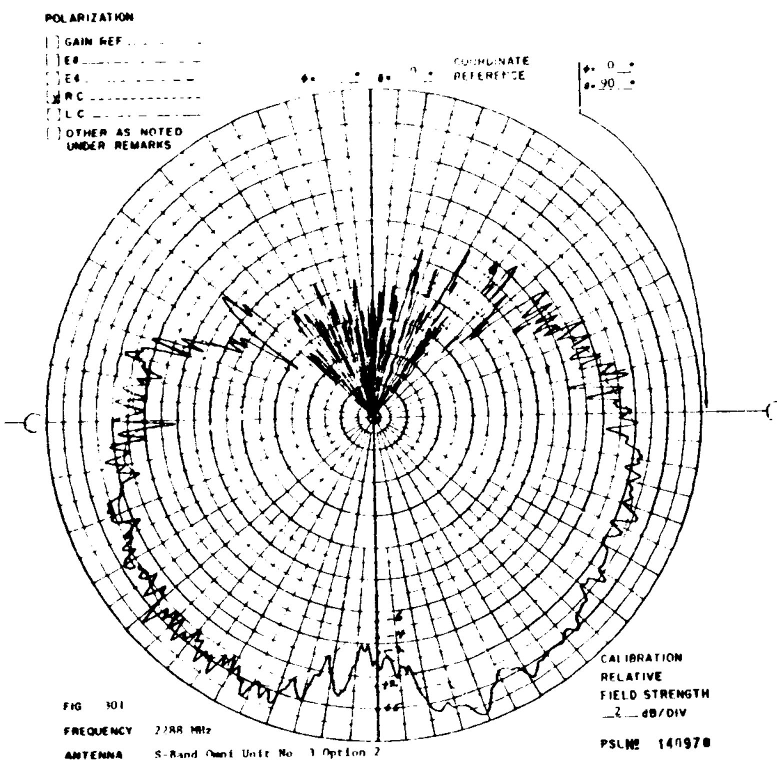


FIG 301
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Unit No. 3 Option 2
REMARKS Solar Array (-X)
High Gain Antenna (-Z)

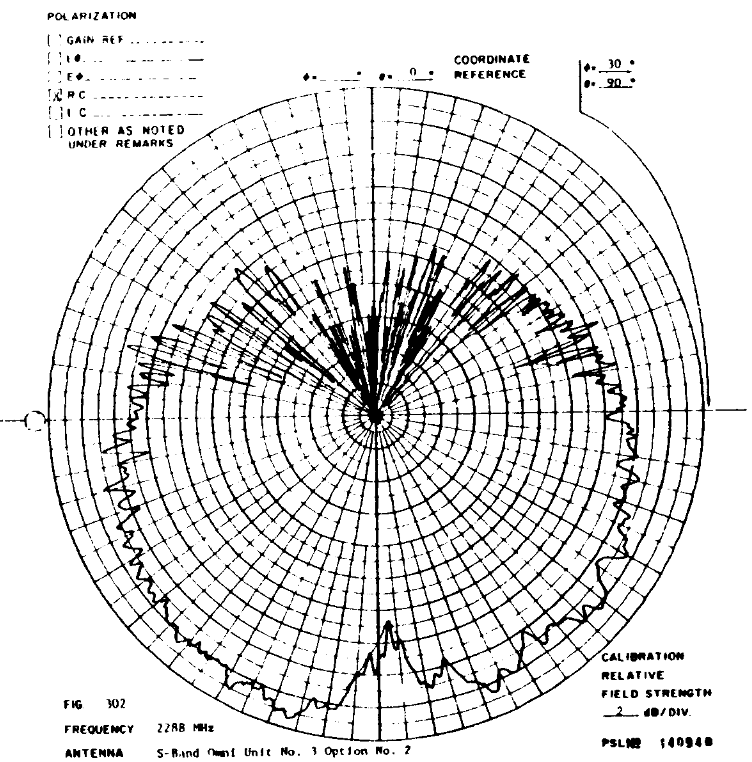
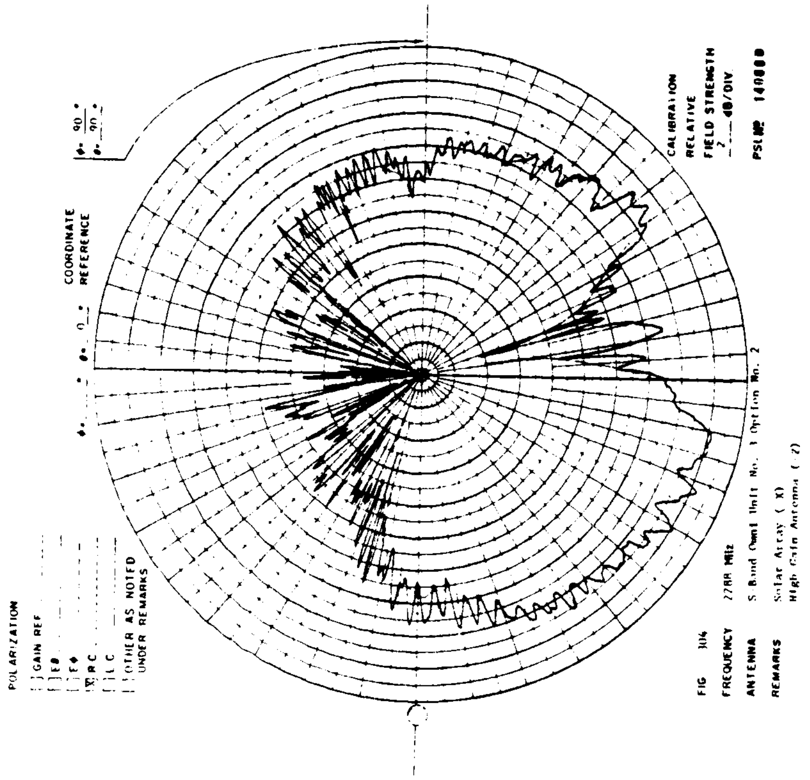
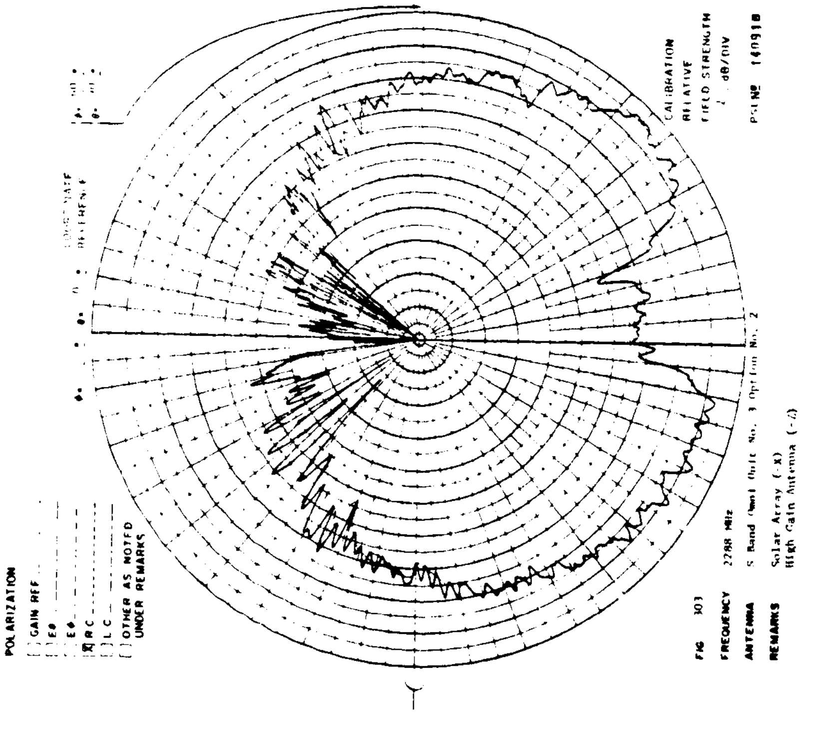


FIG 302
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Unit No. 3 Option No. 2
REMARKS Solar Array (-X)
High Gain Antenna (-Z)


POLARIZATION
GAIN REF
Eθ
Eφ
RC
LC
OTHER AS NOTED UNDER REMARKS
COORDINATE REFERENCE
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
PSL № 140880
FIG 304
FREQUENCY 2288 MHz
ANTENNA S Band Omni Unit No. 1 Option No. 2
REMARKS Solar Array (-X) High Gain Antenna (-Z)


POLARIZATION
GAIN REF
Eθ
Eφ
RC
LC
OTHER AS NOTED UNDER REMARKS
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
PSL № 140918
FIG 303
FREQUENCY 2288 MHz
ANTENNA S Band Omni Unit No. 1 Option No. 2
REMARKS Solar Array (-X) High Gain Antenna (-Z)

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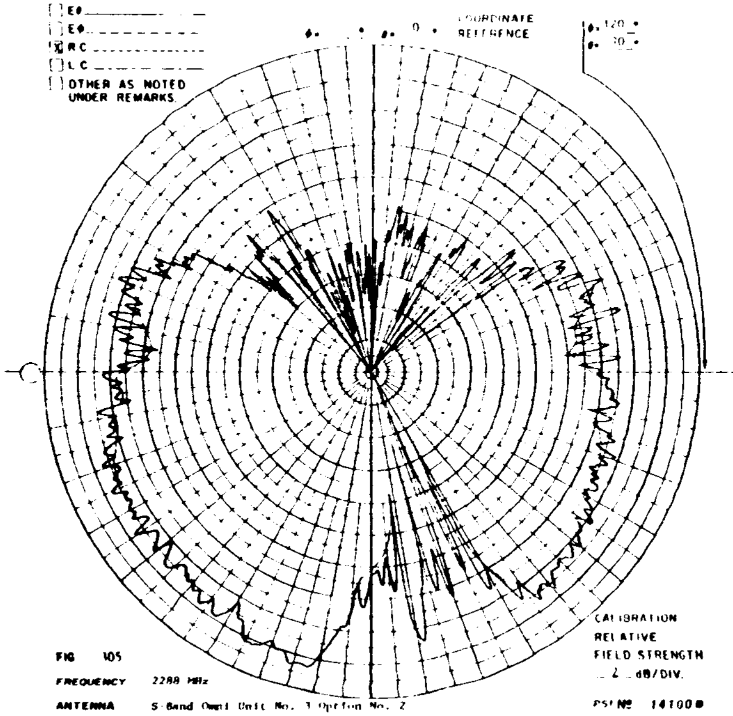

FIG 105
FREQUENCY 2288 MHz
ANTENNA S Band Omni Unit No. 3 Option No. 2
REMARKS Solar Array (-X)
High Gain Antenna (-Z)

PSL № 141008

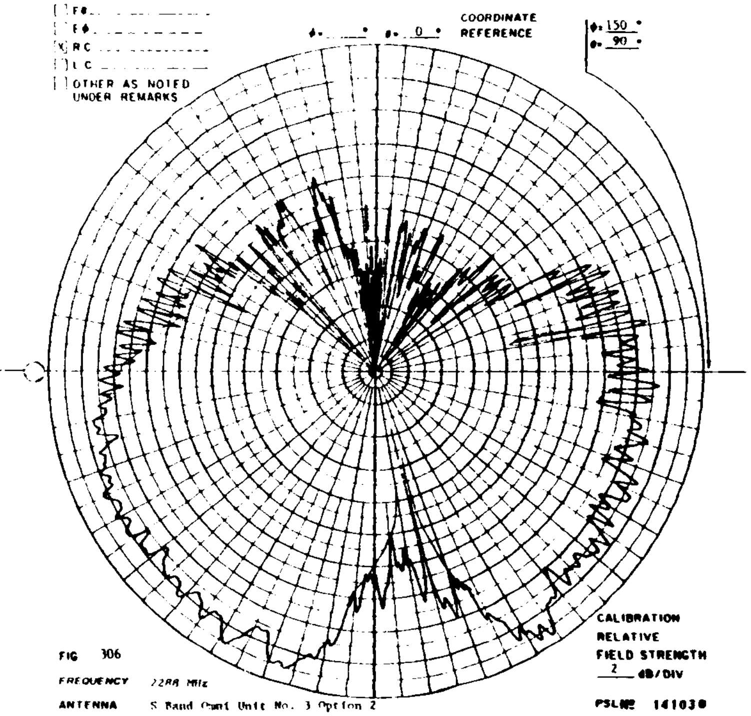

FIG 306
FREQUENCY 2288 MHz
ANTENNA S Band Omni Unit No. 3 Option 2
REMARKS Solar Array (-X)
High Gain Antenna (-Z)

PSL № 141030

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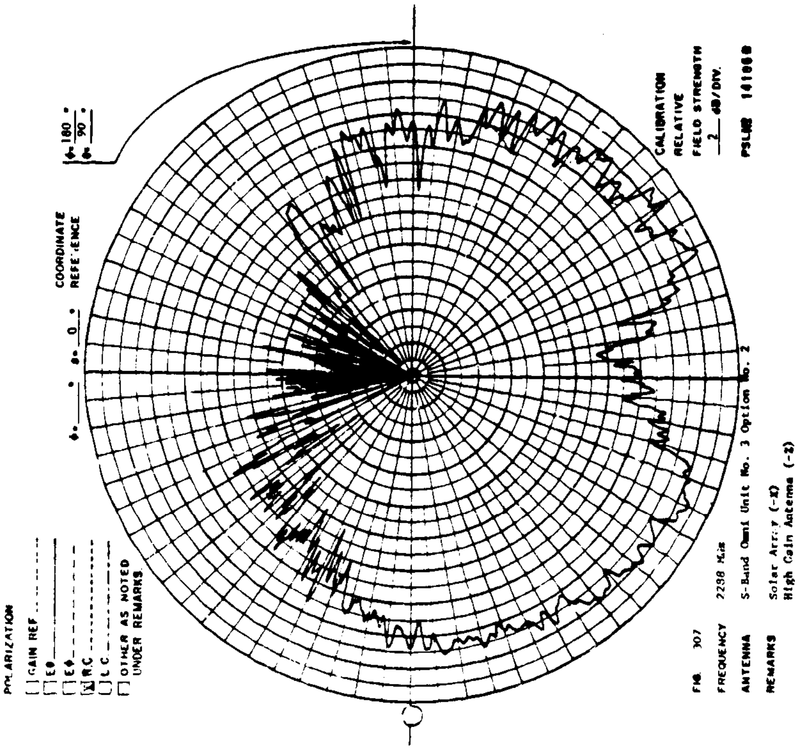

12.22 GPS Antenna - 1228 MHz
Antenna Patterns - Solar Array (-X)

12.22.1 R.C. Polarization
High-Gain Antenna (-Z)
Antenna Range Leg Length - 3000 Feet

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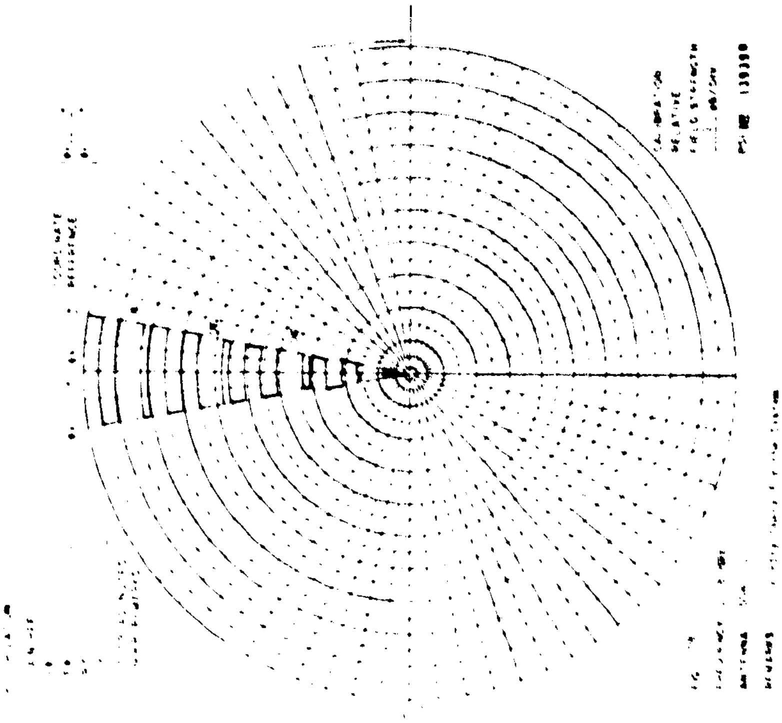

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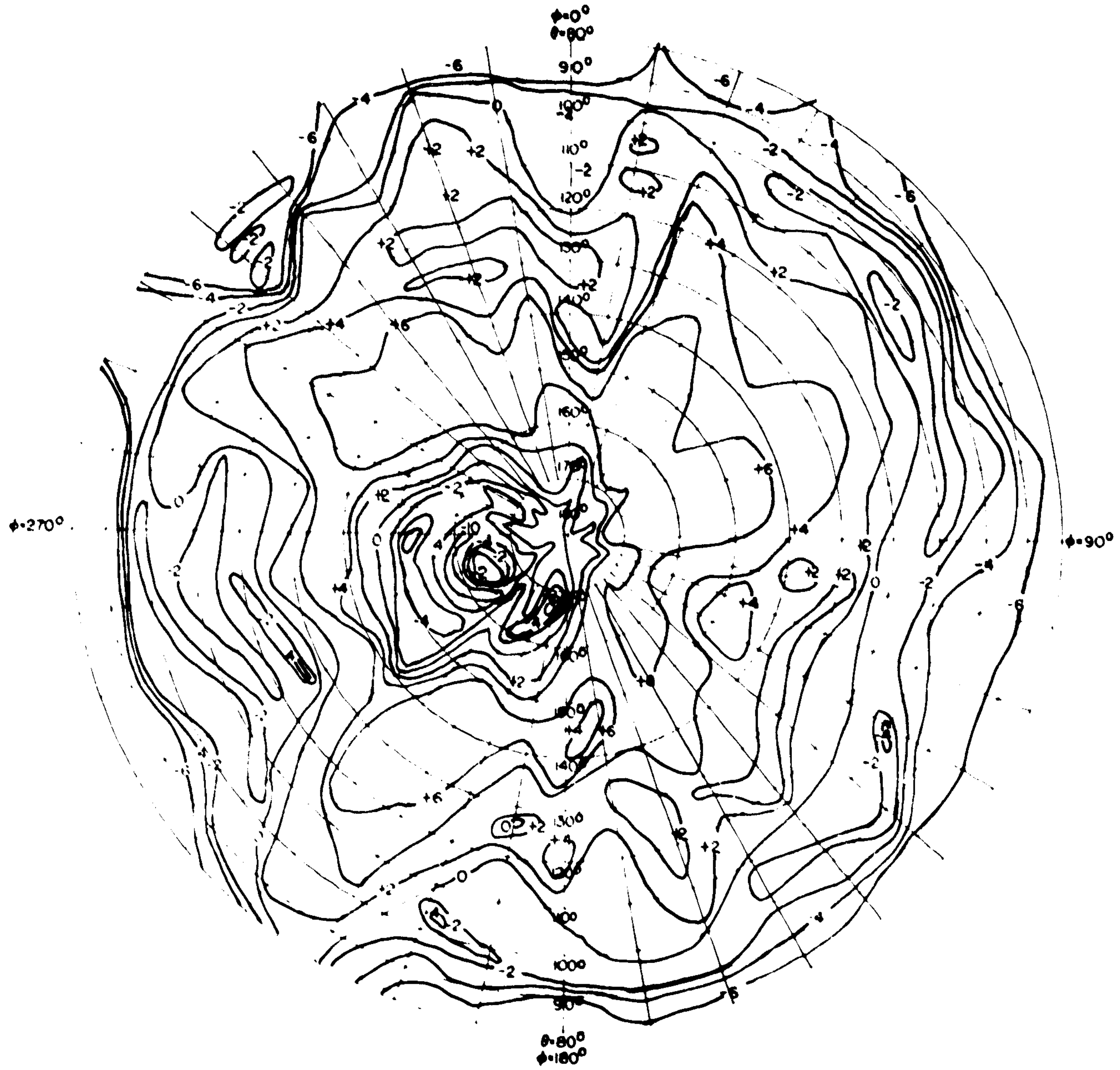

FIG. NO. [illegible] POWER CONTOUR GRAPH			
PROGRAM	LANDSAT D	**POLARIZATION**	R C
ANTENNA	GPS	**GAIN REFERENCE**	SGH LHORN
FREQUENCY	1228 MHz	**ENGINEER**	C C Post
MODEL SCALE	FULL		
REMARKS			
SOLAR ARRAY (X)			
HIGH GAIN ANTENNA (2)			

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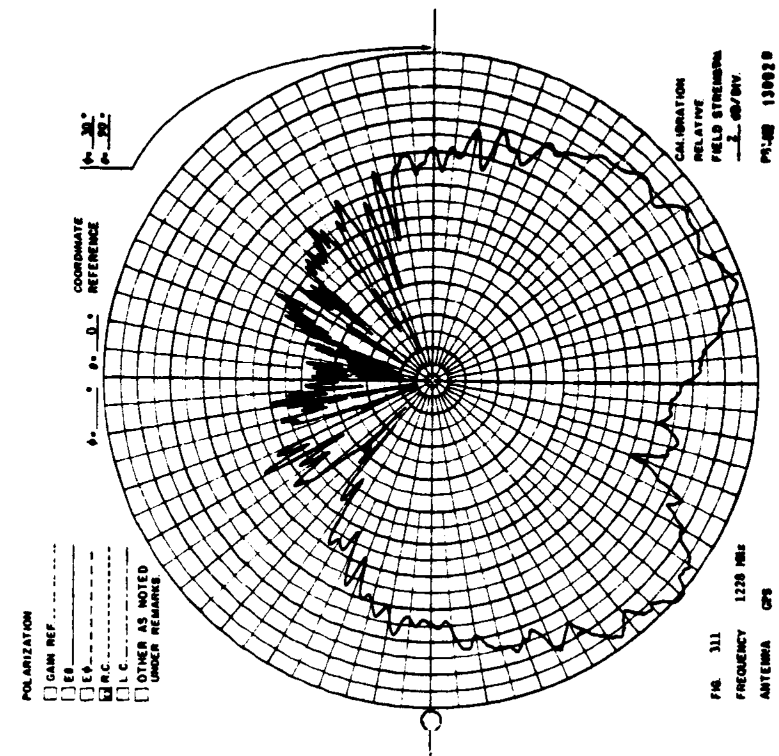
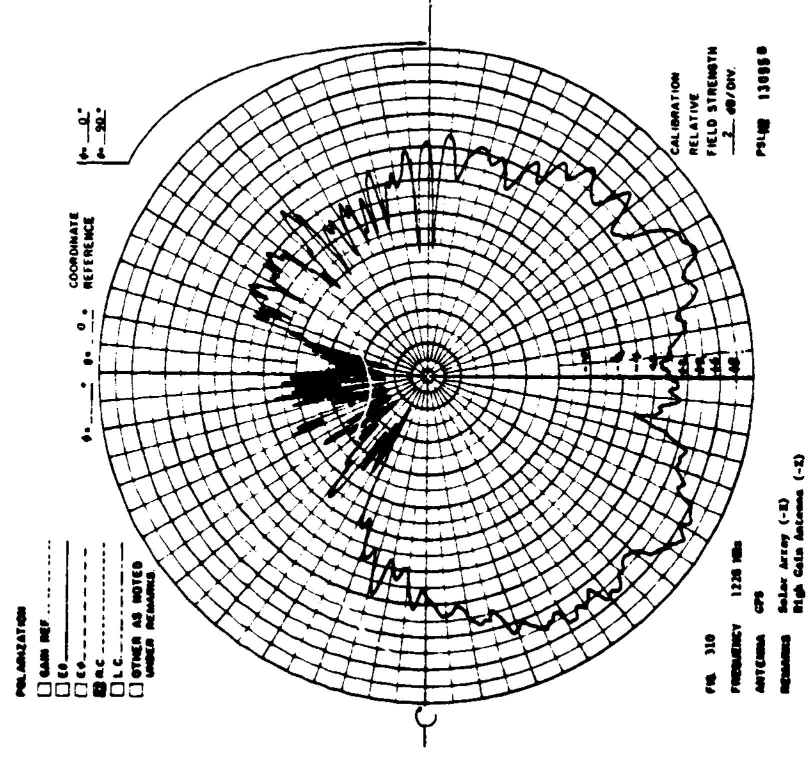
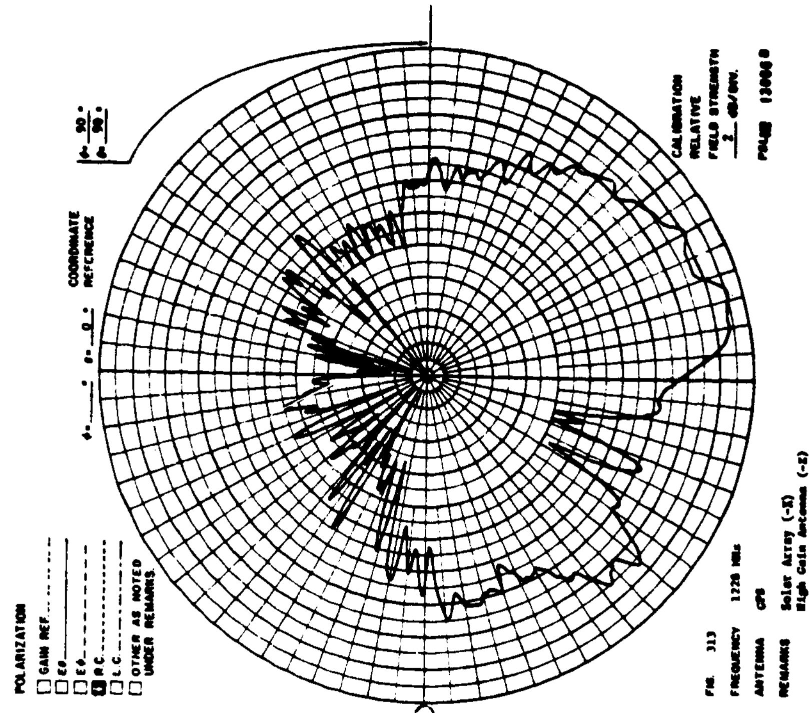
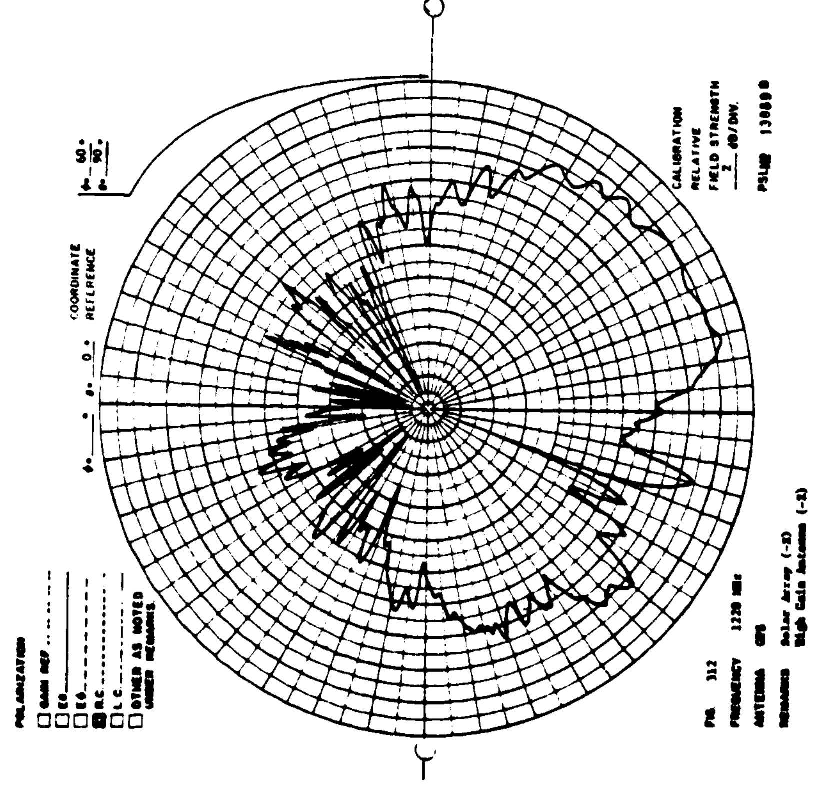





POLARIZATION
GAIN REF.
Eθ
Eφ
R.C.
L.C.
OTHER AS NOTED UNDER REMARKS
COORDINATE REFERENCE
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.
FN. 313
FREQUENCY 1220 MHz
ANTENNA GPS
REMARKS Solar Array (-X)
High Gain Antenna (-Z)


POLARIZATION
GAIN REF.
Eθ
Eφ
R.C.
L.C.
OTHER AS NOTED UNDER REMARKS
COORDINATE REFERENCE
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.
FN. 312
FREQUENCY 1220 MHz
ANTENNA GPS
REMARKS Solar Array (-X)
High Gain Antenna (-Z)

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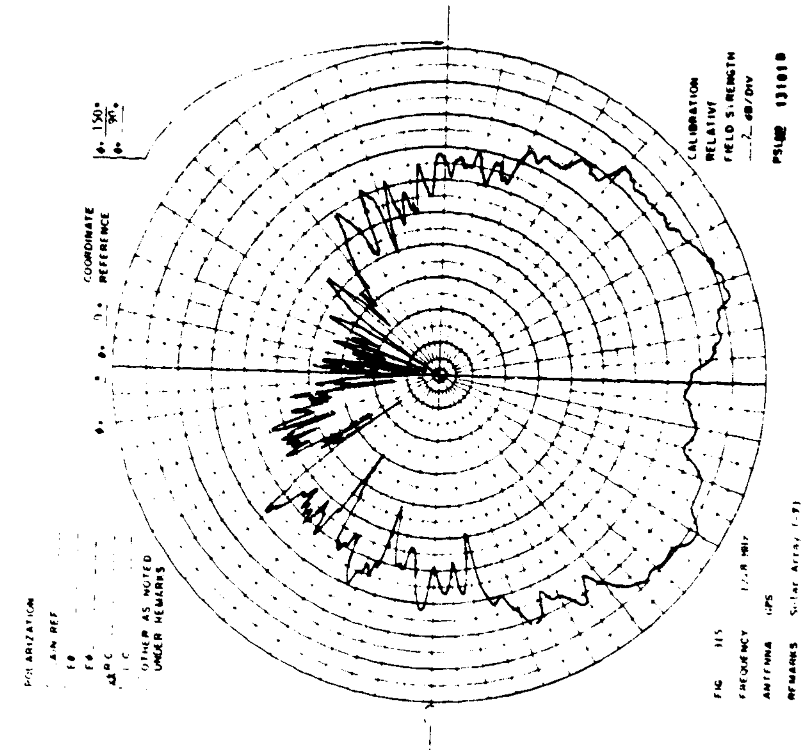

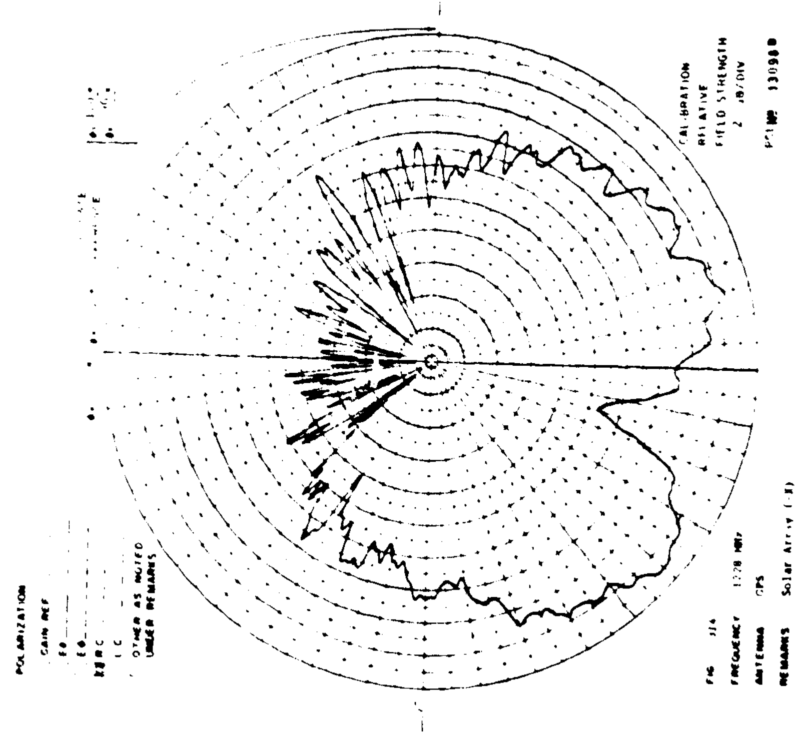

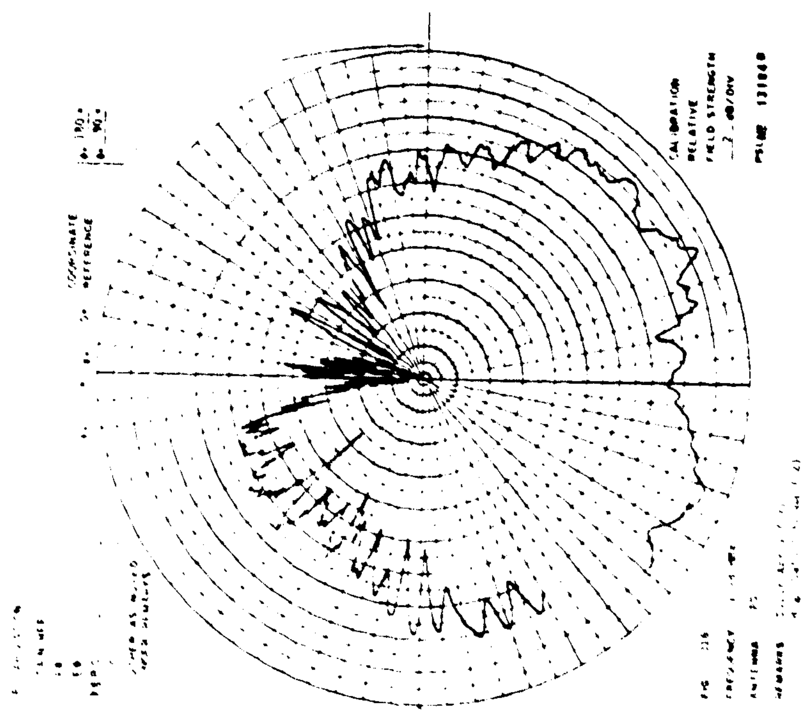
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
COORDINATE
REFERENCE

12.23 GPS Antenna - 1228 MHz
Antenna Patterns - Solar Array (-Z)

12.23.1 R.C. Polarization
High-Gain Antenna (-Z)
Antenna Range Leg Length - 3000 Feet

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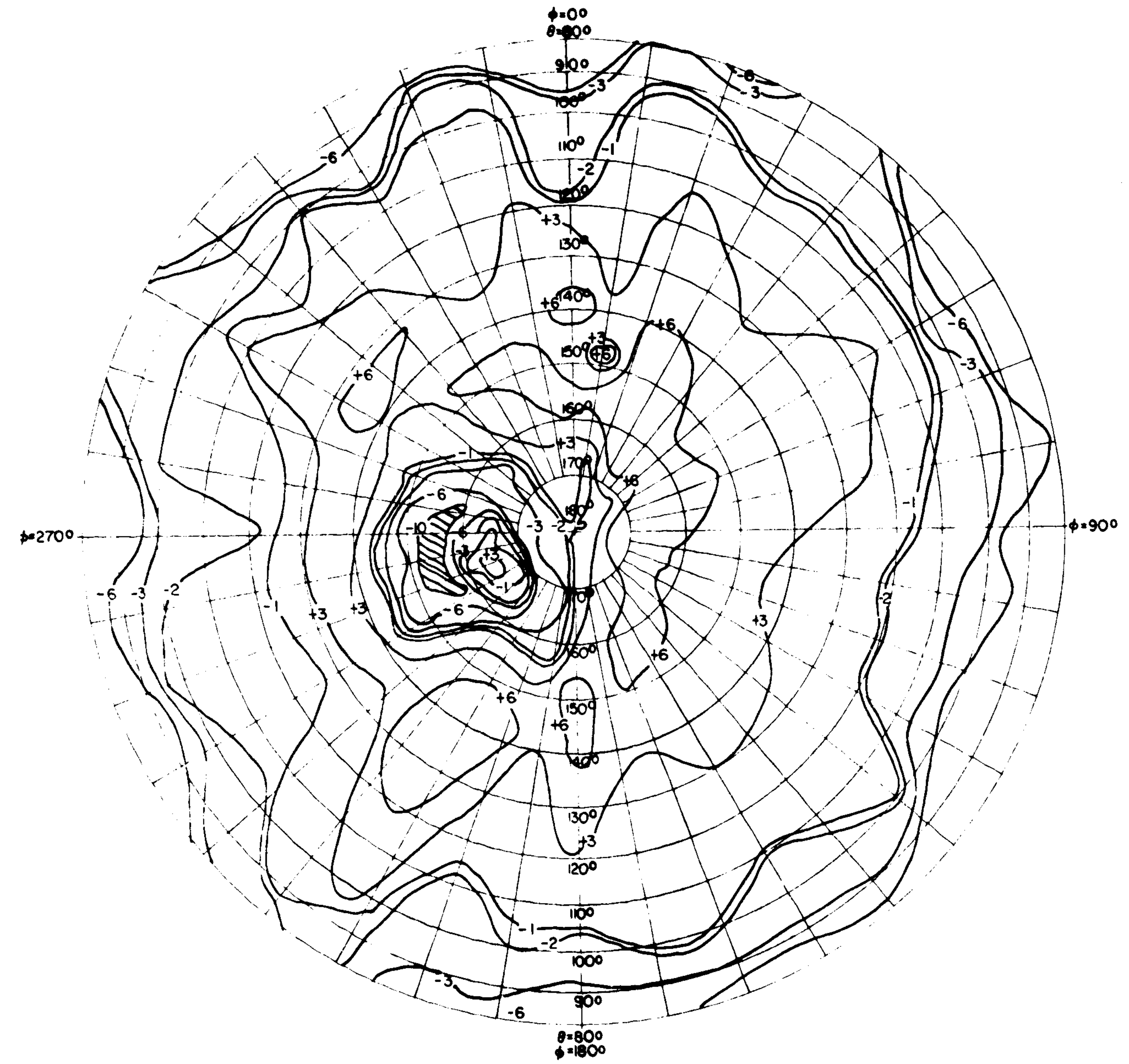

FIG. NO. 317 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT-D	**POLARIZATION**	R.C.
ANTENNA	GPS	**GAIN REFERENCE**	SGH-L.1 HORN
FREQUENCY	1228 MHz	**ENGINEER**	C.C. Post
MODEL SCALE	FULL	ORBIT CONFIGURATION	
REMARKS			
	SOLAR PANEL (-Z)		
	HIGH-GAIN ANTENNA (-Z)		

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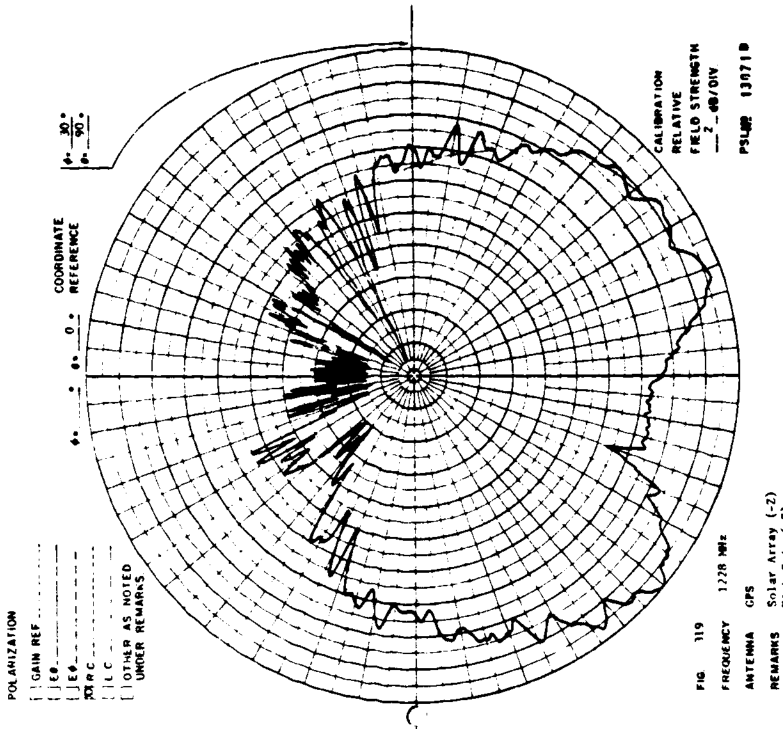
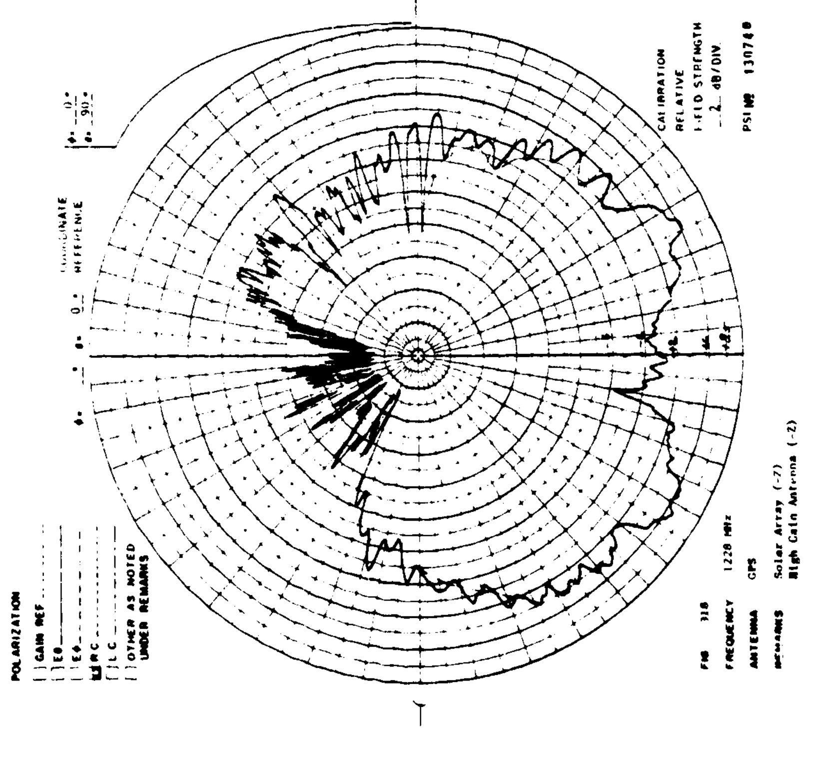
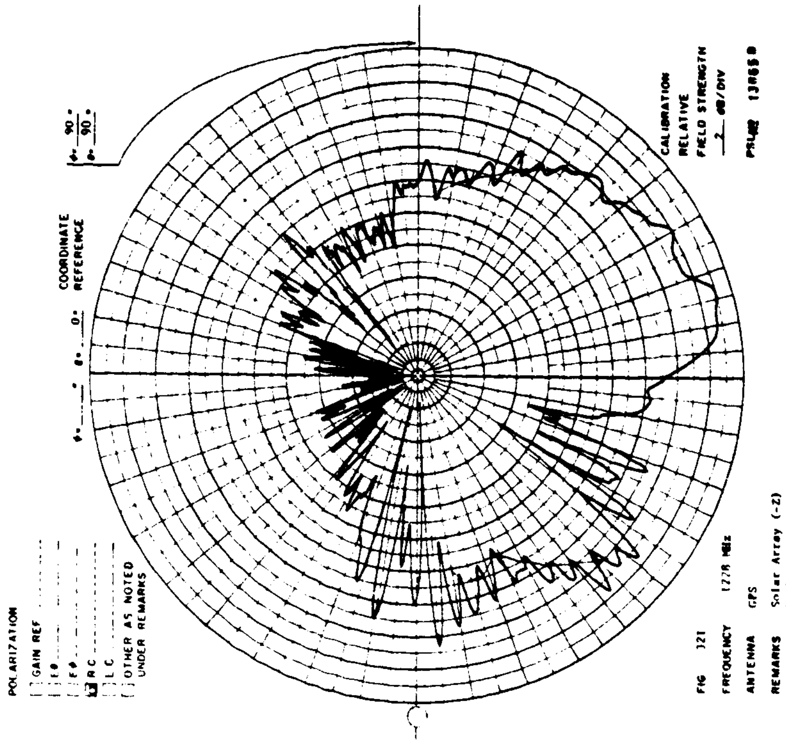
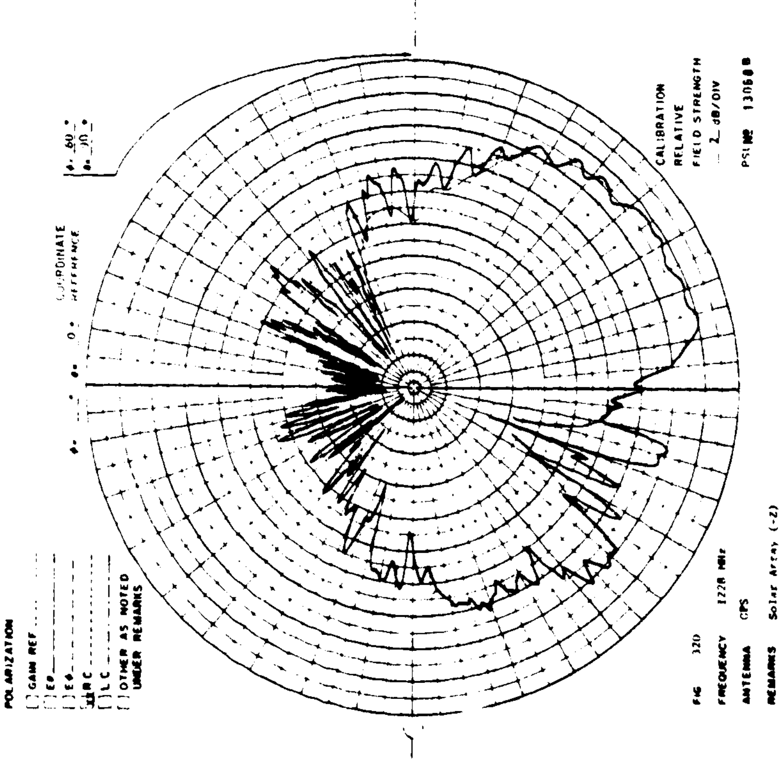




ORIGINAL PAGE IS OF POOR QUALITY





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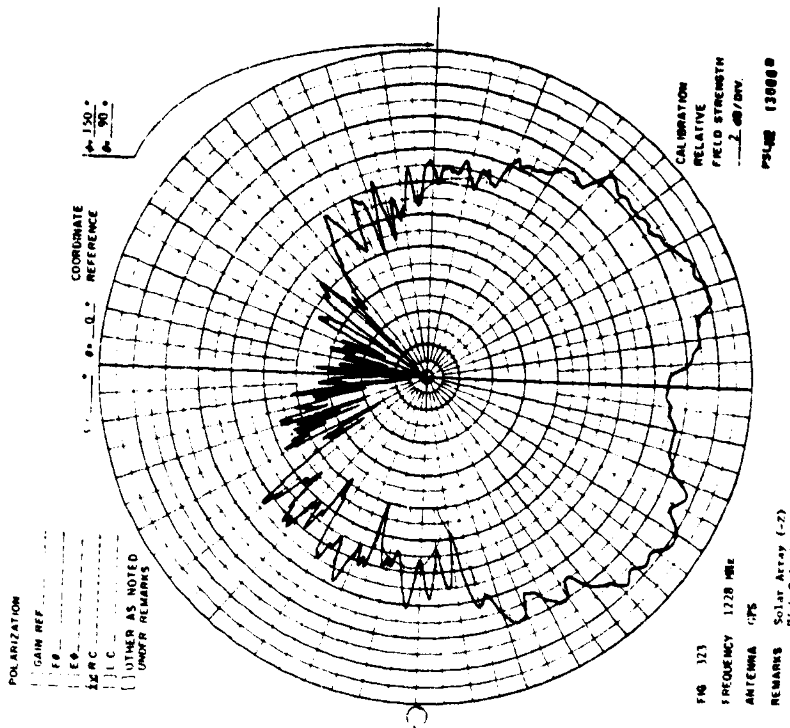

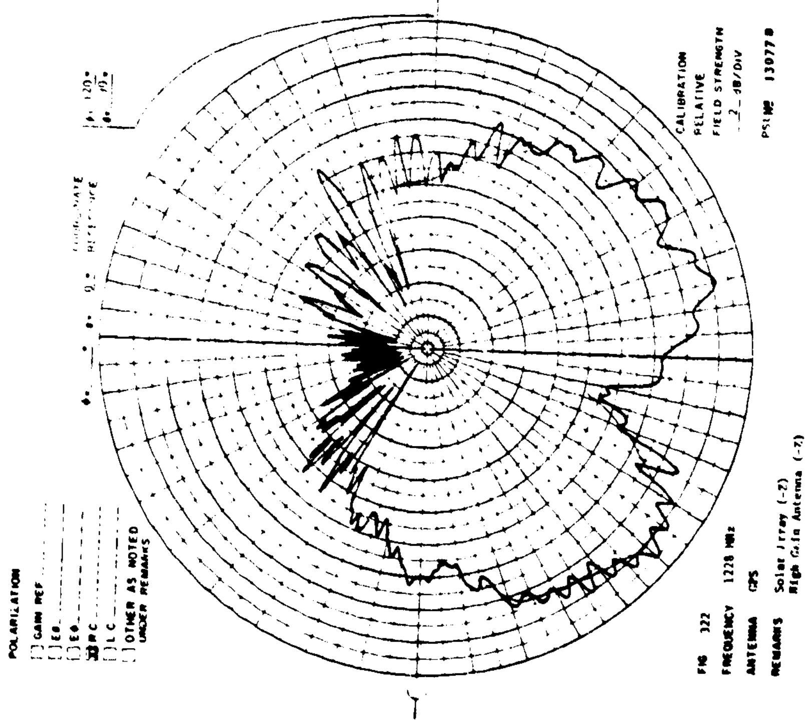

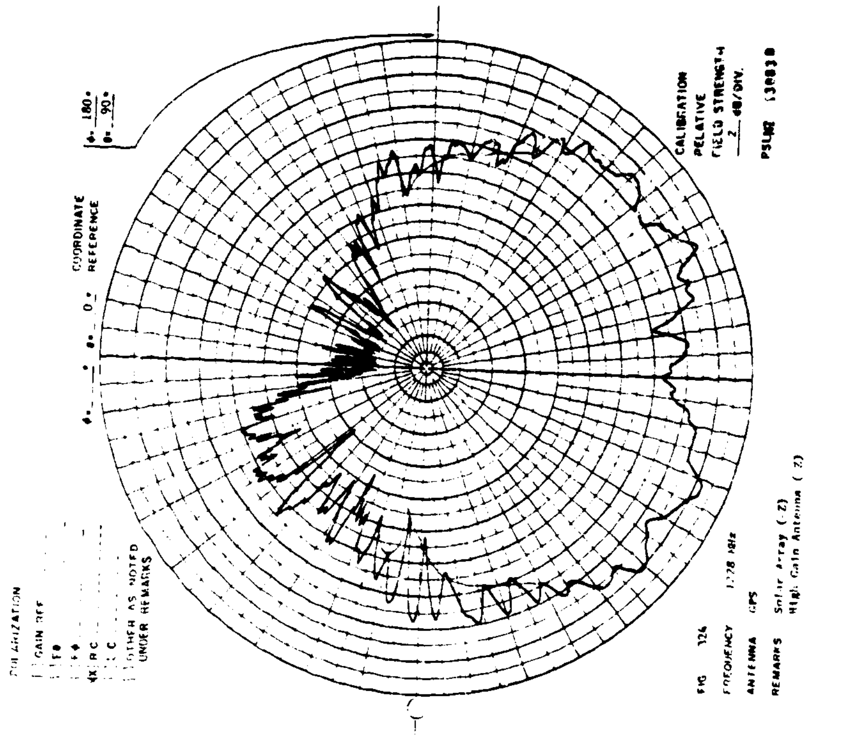
COORDINATE
REFERENCE
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.
OTHER AS NOTED
UNDER REMARKS
ANTENNA GPS
REMARKS Solar Array (-Z)
High Gain Antenna (-Z)

12.24 GPS Antenna - 1228 MHz
Antenna Patterns - Solar Array (+Z)

12.24.1 R.C. Polarization
High-Gain Antenna (-Z)
Antenna Range Leg Length - 3000 Feet

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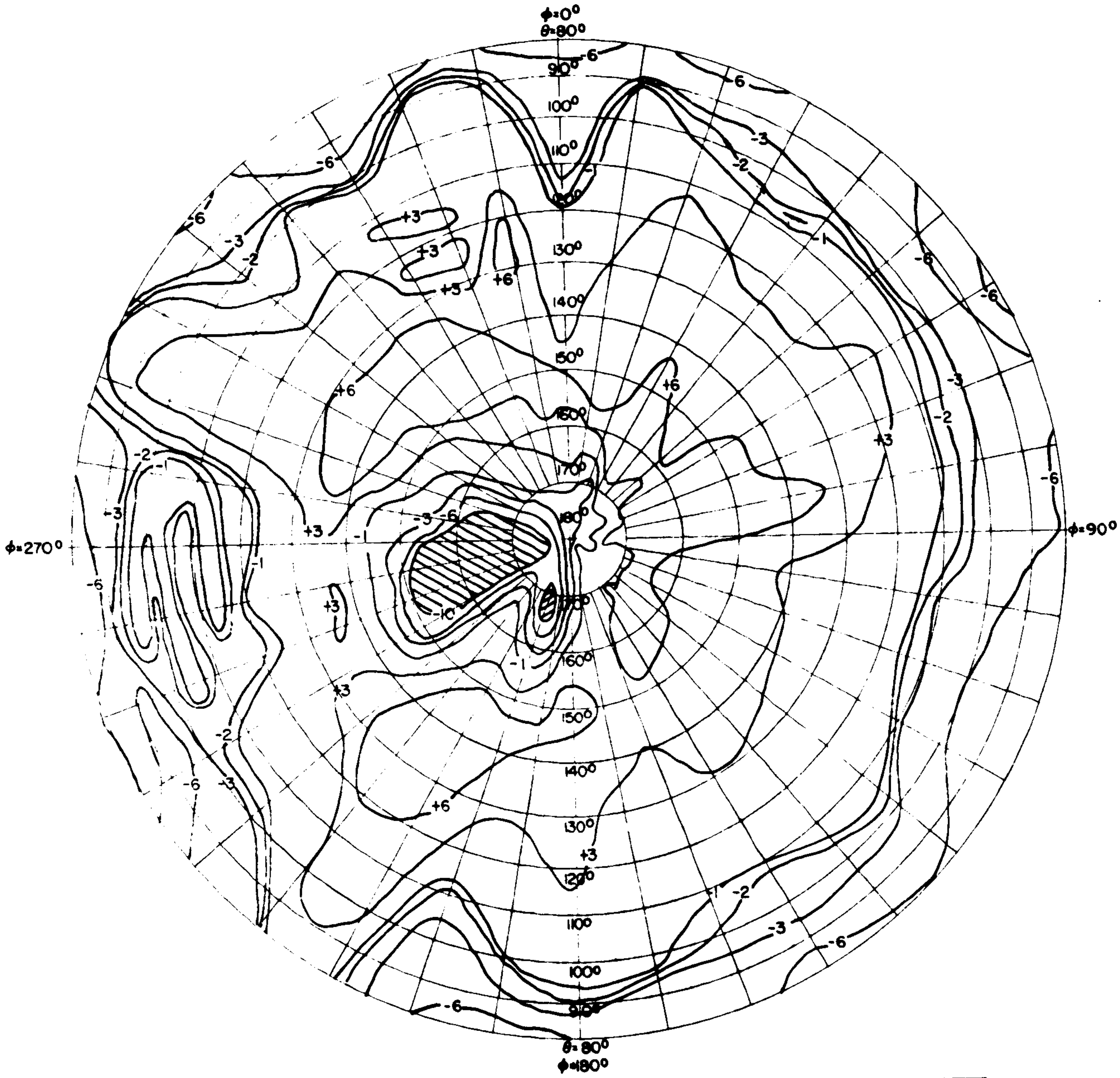

FIG. NO. 325 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT-D	POLARIZATION	R.C.
ANTENNA	GPS	GAIN REFERENCE	SGH-1.1 HORN
FREQUENCY	1228 MHz	ENGINEER	C.C. Post
MODEL SCALE	FULL		
REMARKS			
	SOLAR PANEL (+Z)		
	HIGH-GAIN ANTENNA (-Z)		

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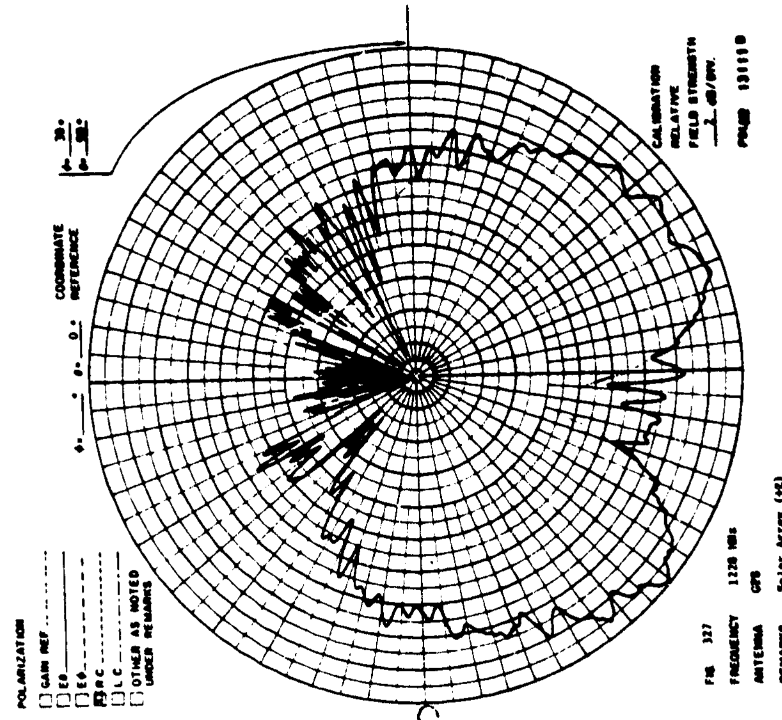

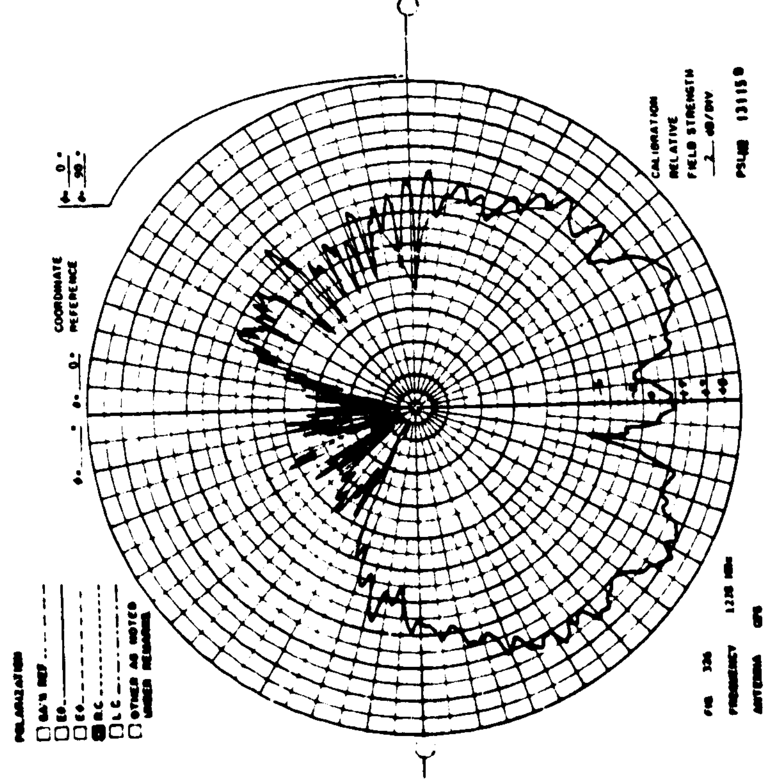

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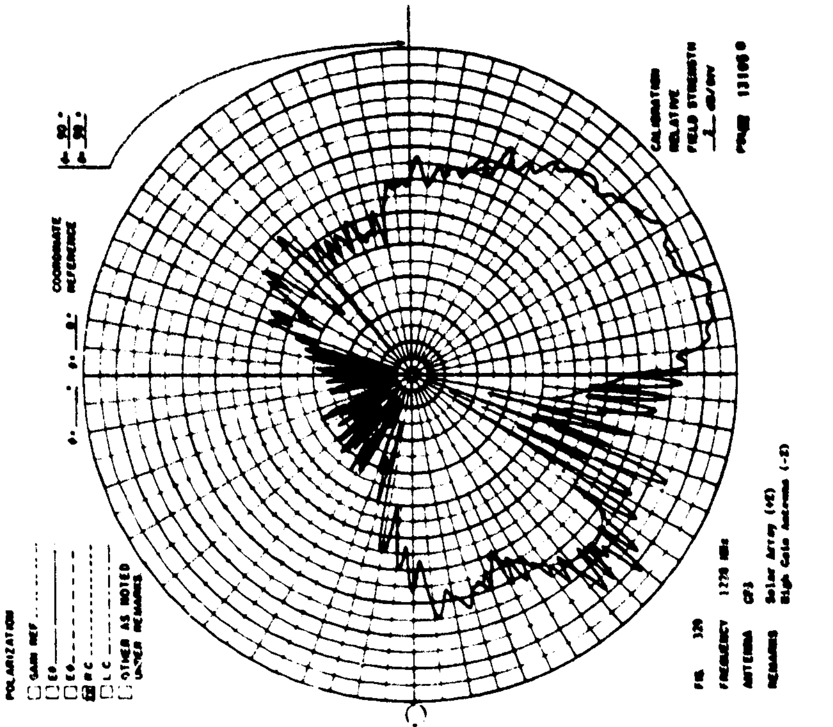
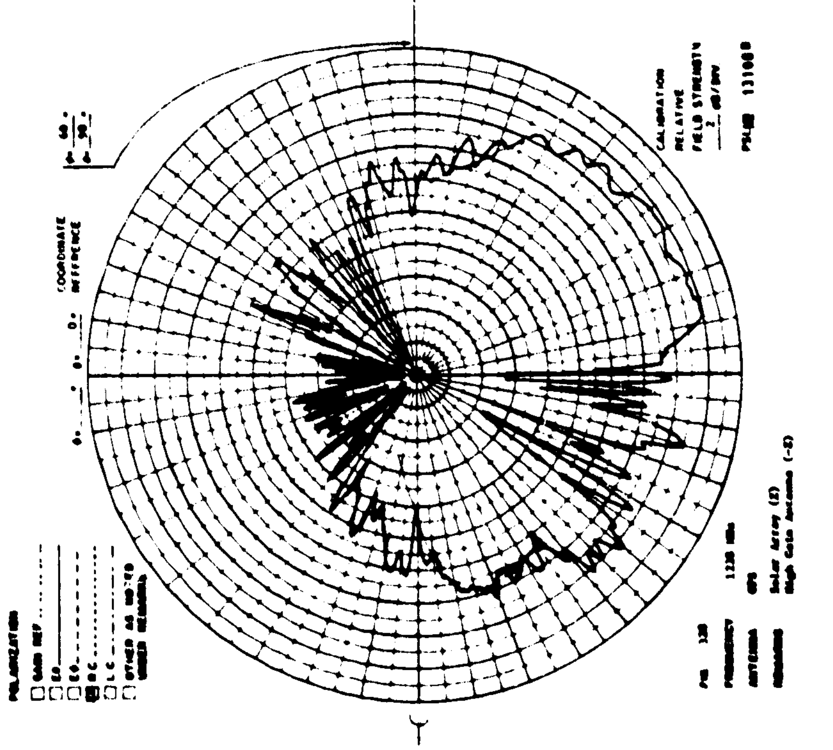
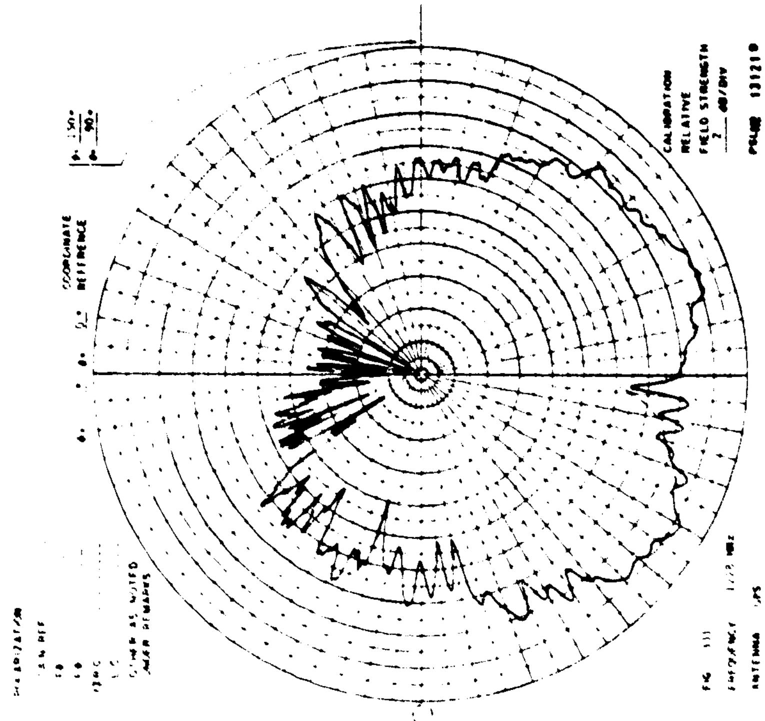
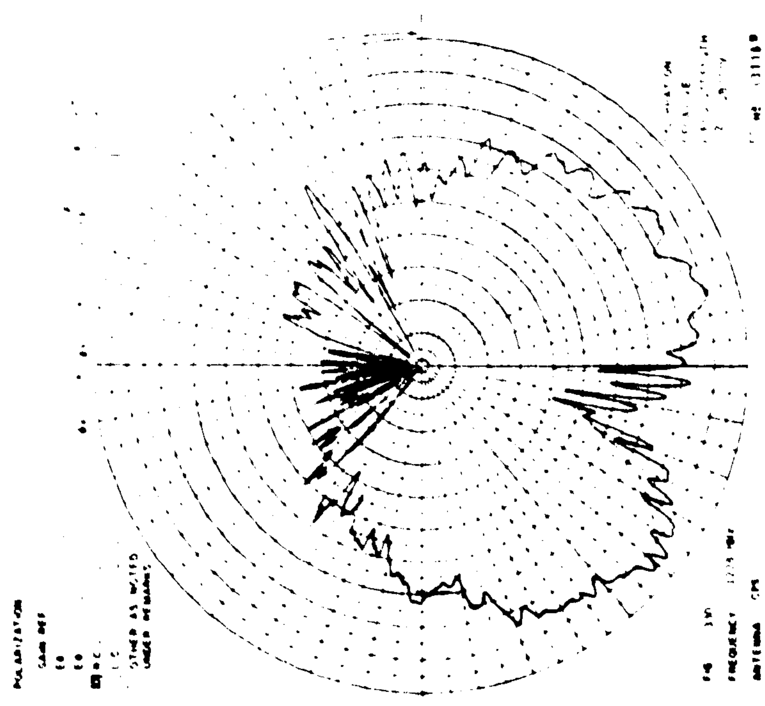





COORDINATE REFERENCE
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
POLARIZATION
OTHER AS NOTED UNDER REMARKS
FIG.
FREQUENCY
ANTENNA
REMARKS
Solar Array (+Z)
High Gain Antenna (-Z)


POLARIZATION
OTHER AS NOTED UNDER REMARKS
FIG.
FREQUENCY
ANTENNA GPS
REMARKS
Solar Array (+Z)
High Gain Antenna (-Z)

12.25 GPS Antenna - 1575 MHz

Antenna Patterns - Solar Array (-X)

12.25.1 R.C. Polarization

High-Gain Antenna (-Z)

Antenna Range Leg Length - 3000 Feet

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NEED -2dBi -
FOR ≥ 2.2dB MARGIN
.5dB NF REDUCTION

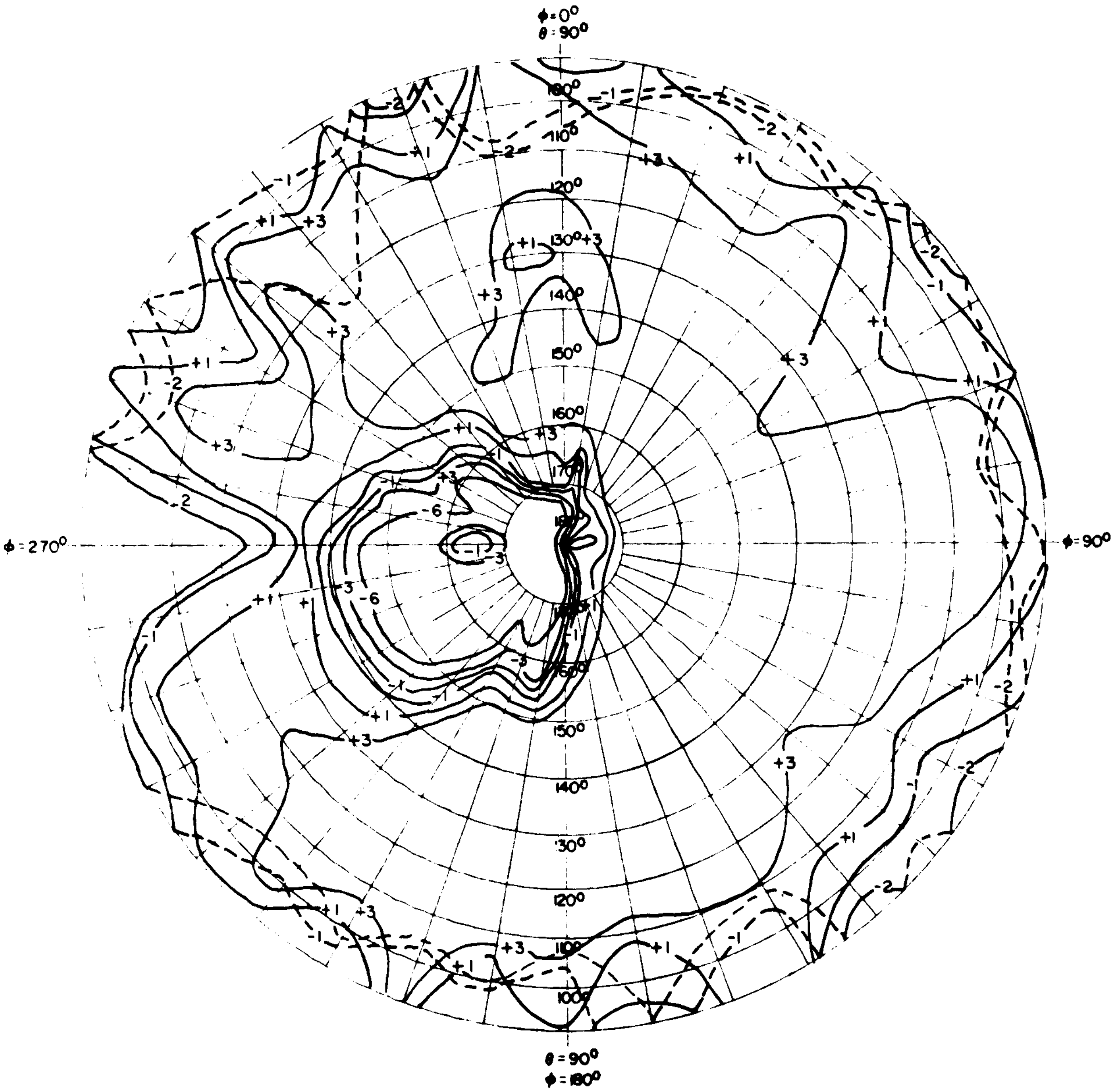
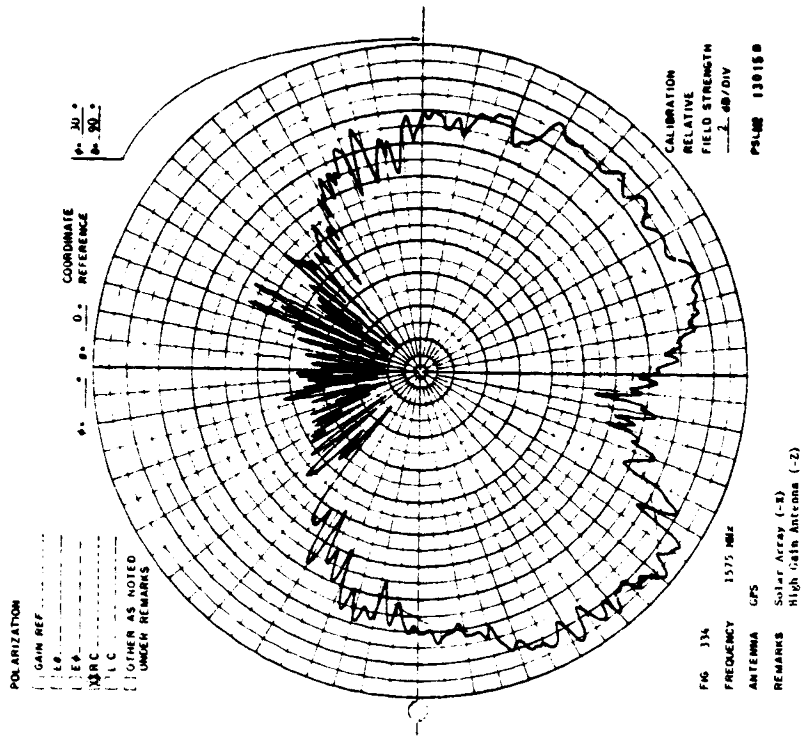
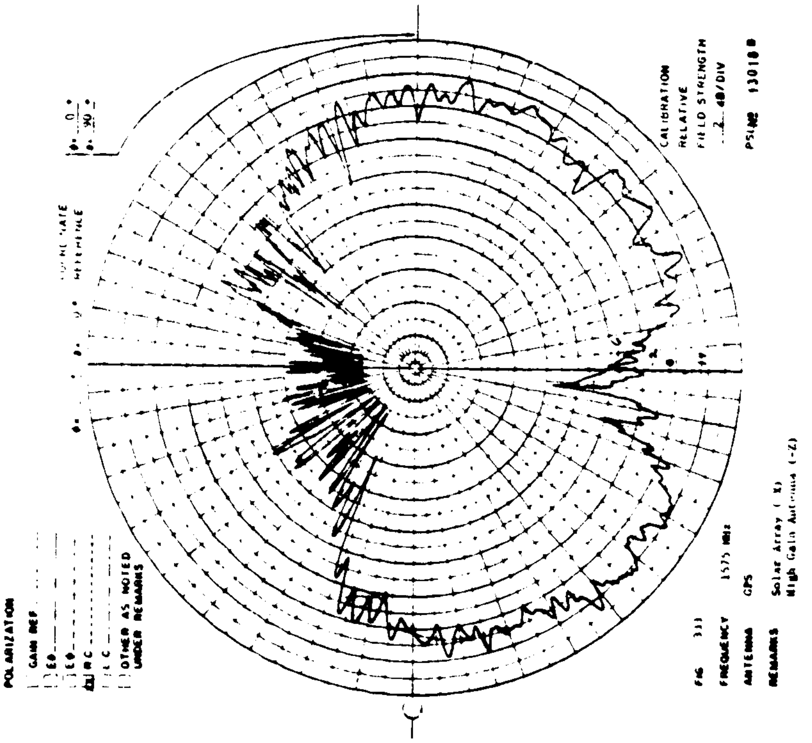
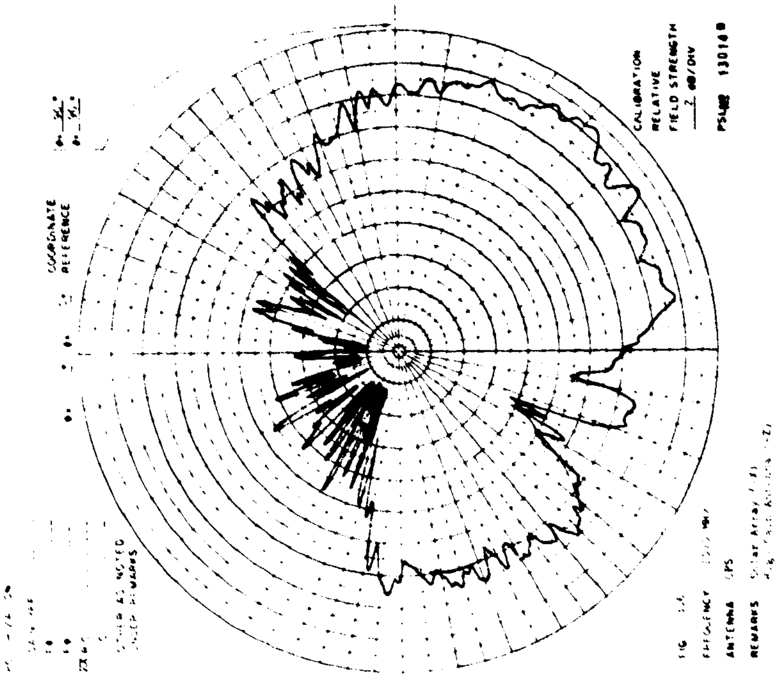
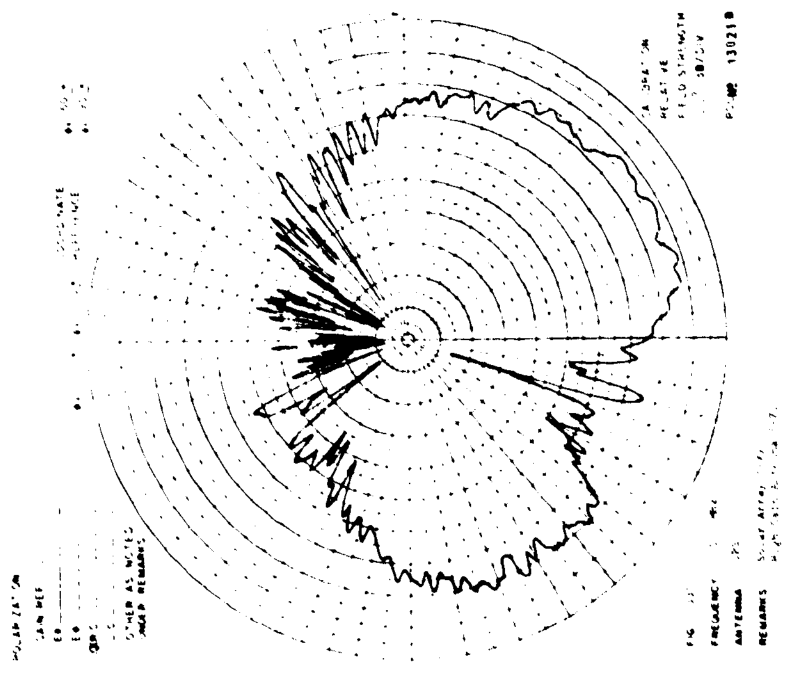


FIG. NO. 332 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT D	POLARIZATION	R.C.
ANTENNA	GPS	GAIN REFERENCE	SGH 1.1 HORN
FREQUENCY	1575 MHz	ENGINEER	C.C. POST
MODEL SCALE	FULL		
REMARKS	SOLAR ARRAY (-X)		
	HIGH GAIN ANTENNA (-Z)		
(-1 dB) DASHED LINE REPRESENTS EARTH VIEW FROM θ = 90 TOWARD θ = 0			


POLARIZATION
GAIN REF
Eθ
Eφ
RC
LC
OTHER AS NOTED UNDER REMARKS
COORDINATE REFERENCE
FIG 334
FREQUENCY 1575 MHz
ANTENNA GPS
REMARKS Solar Array (-X)
High Gain Antenna (-Z)
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
130158


POLARIZATION
GAIN REF
Eθ
Eφ
RC
LC
OTHER AS NOTED UNDER REMARKS
FIG
FREQUENCY 1575 MHz
ANTENNA GPS
REMARKS Solar Array
High Gain Antenna (-Z)
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
130188


COORDINATE REFERENCE
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV
OTHER AS NOTED
HEAD REMARKS
FREQUENCY
ANTENNA
REMARKS


COORDINATE REFERENCE
FIELD STRENGTH
OTHER AS NOTED
HEAD REMARKS
FREQUENCY
ANTENNA
REMARKS

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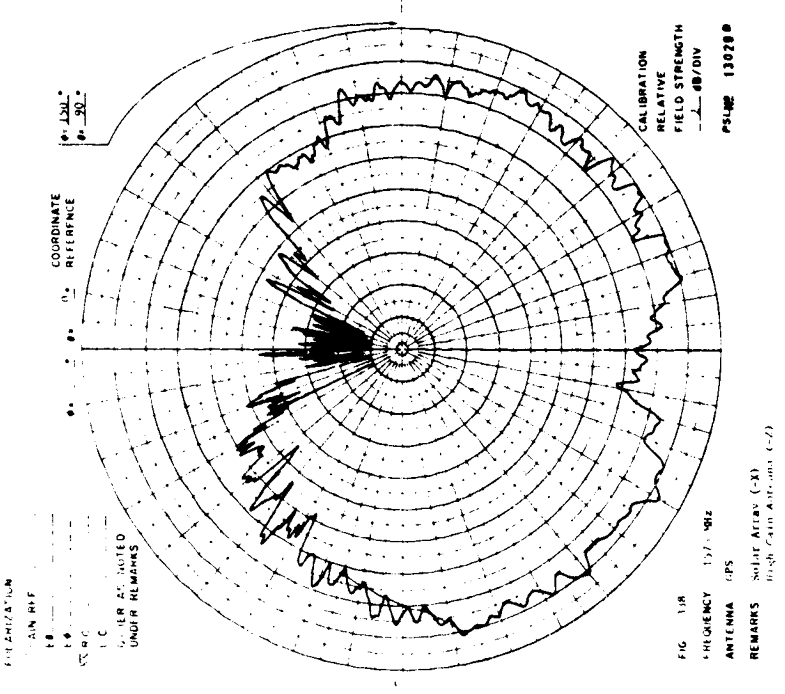

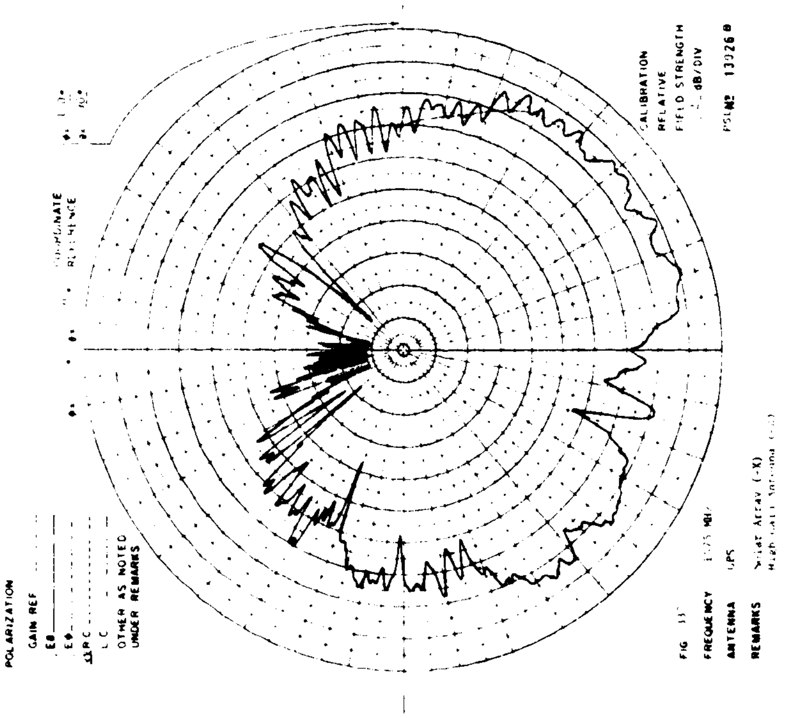

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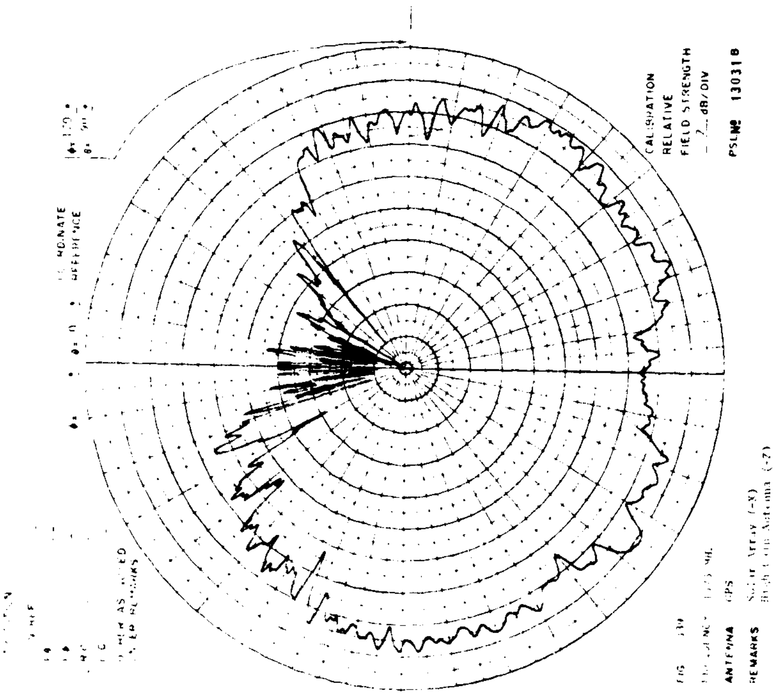

12.26 GPS Antenna - 1575 MHz
Antenna Patterns - Solar Array (-Z)

12.26.1 R.C. Polarization
High-Gain Antenna (-Z)
Antenna Range Leg Length - 3000 Feet

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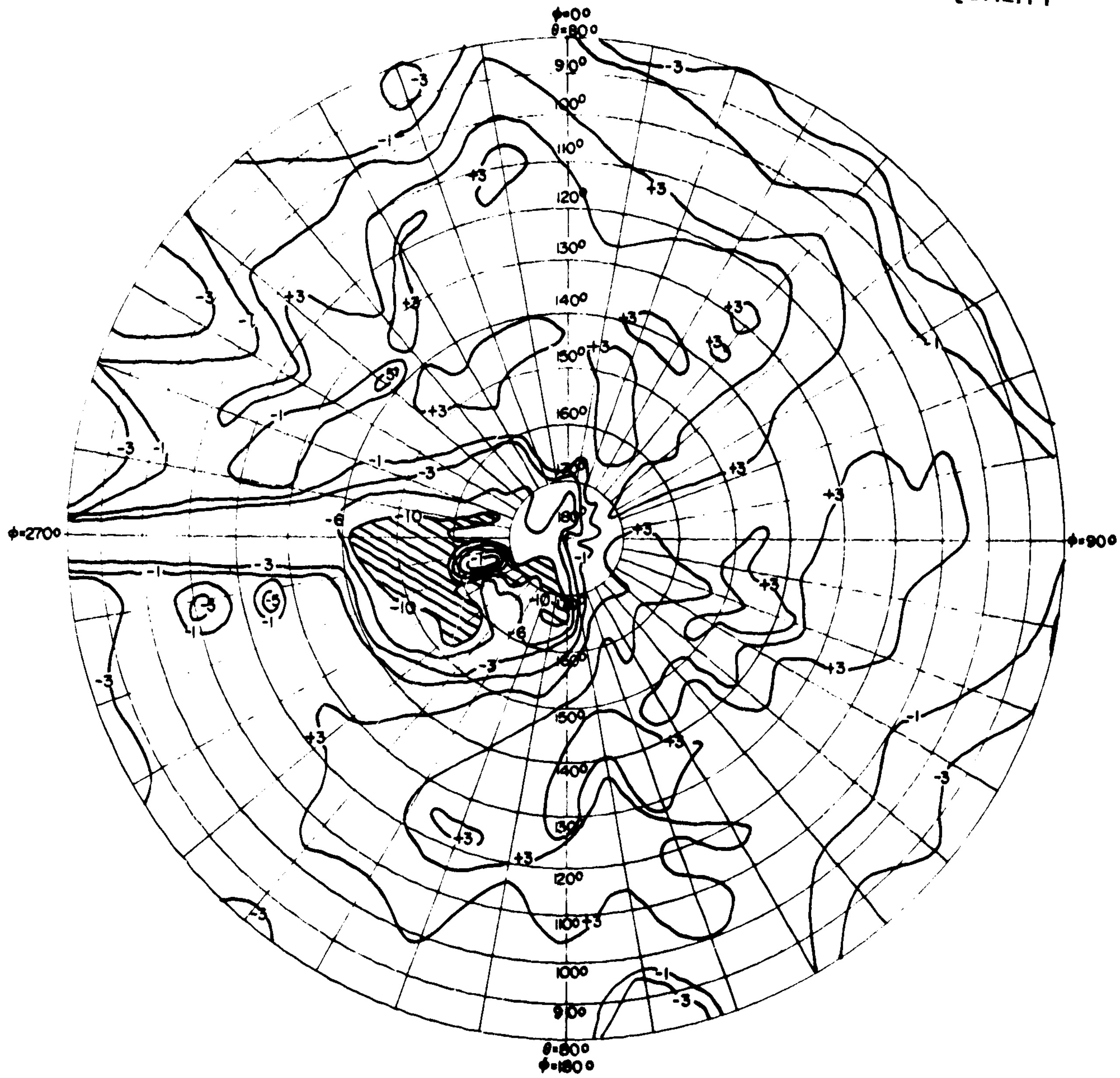

FIG. NO. 340 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT-D	POLARIZATION	R.C.
ANTENNA	GPS	GAIN REFERENCE	SGH-1.1 HORN
FREQUENCY	1575 MHz	ENGINEER	C.C. Post
MODEL SCALE	Full		
REMARKS			
	SOLAR PANEL (-Z)		
	HIGH-GAIN ANTENNA (-Z)		

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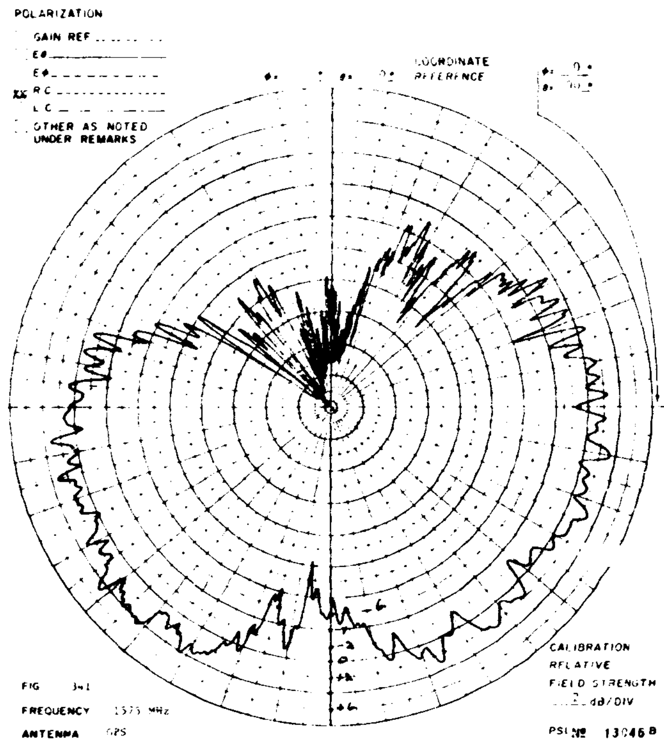

FIG 341
FREQUENCY 1575 MHz
ANTENNA GPS
REMARKS Solar Array (-Z)
High Gain Antenna (-Z)

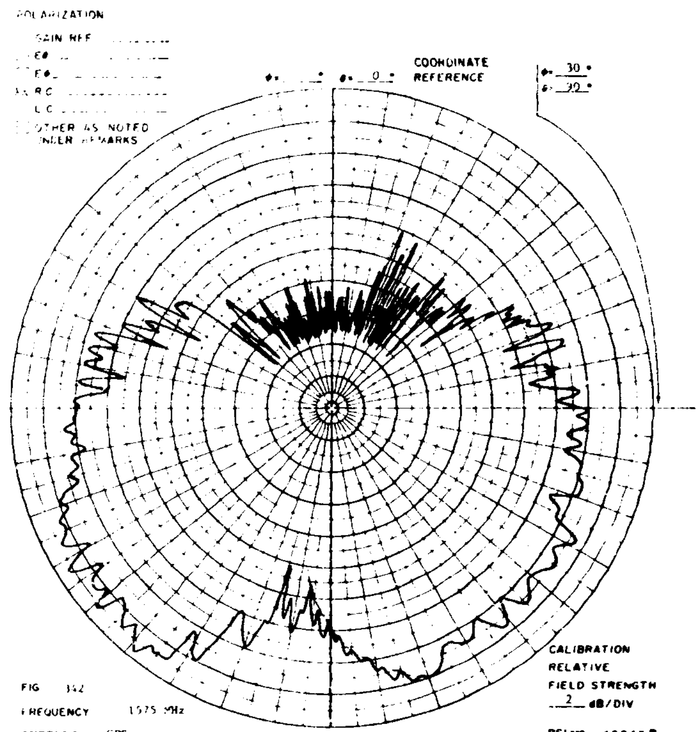

FIG 342
FREQUENCY 1575 MHz
ANTENNA GPS
REMARKS Solar Array (-Z)
High Gain Antenna (-Z)

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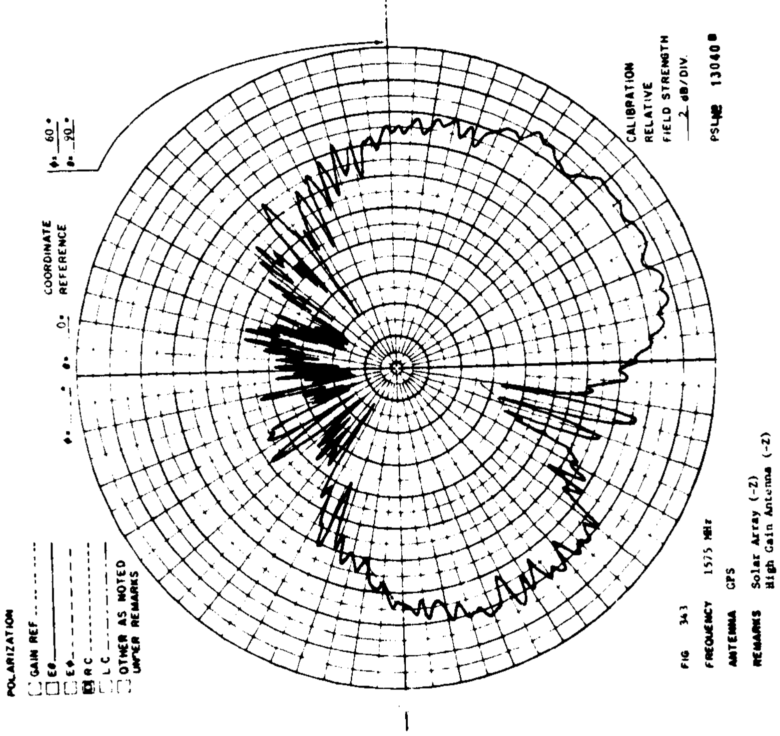

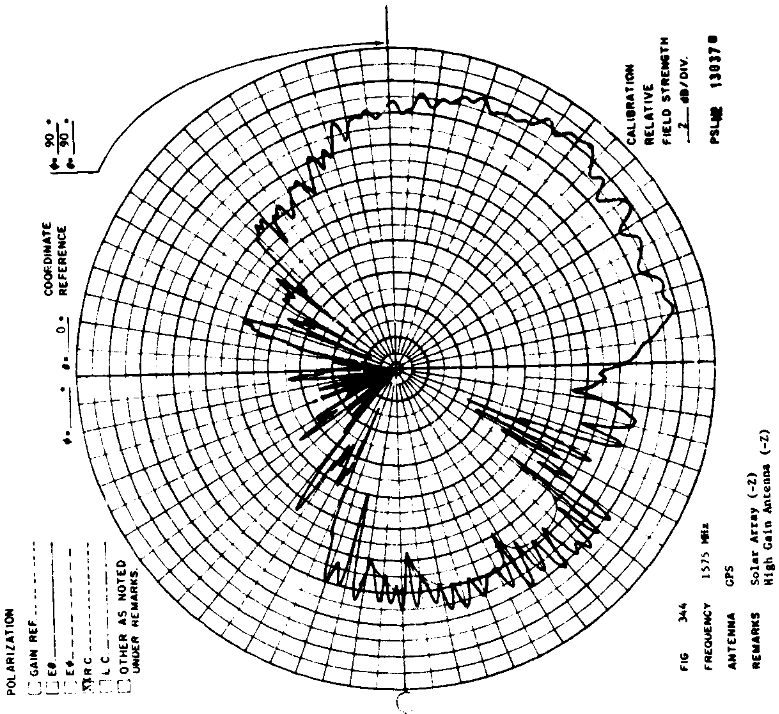

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POLARIZATION
- GAIN REF
- Eθ
- Eϕ
- XX RC
- LC
- OTHER AS NOTED UNDER REMARKS

COORDINATE REFERENCE ϕ= 0° ϕ= 120° θ= 90°

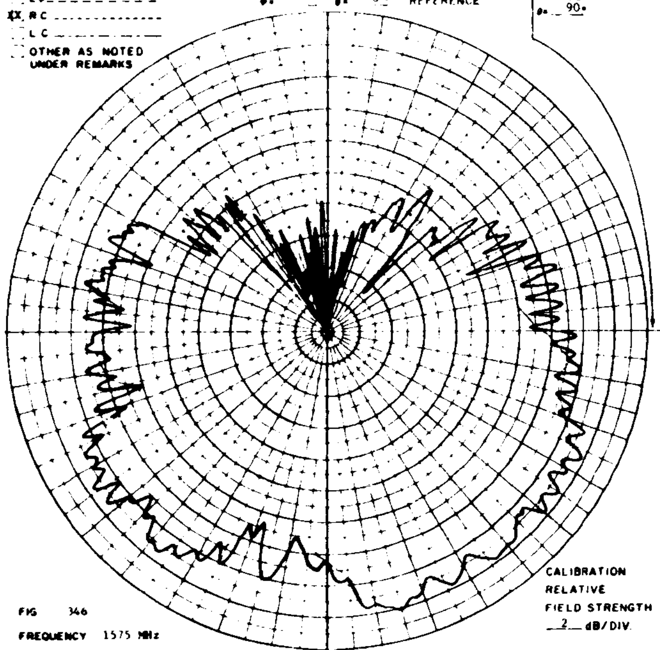

FIG 346
FREQUENCY 1575 MHz
ANTENNA GPS
REMARKS Solar Array (-Z) High Gain Antenna (-Z)

CALIBRATION RELATIVE FIELD STRENGTH 2 dB/DIV.
PSL№ 13052

POLARIZATION
- GAIN REF
- Eθ
- Eϕ
- XX RC
- LC
- OTHER AS NOTED UNDER REMARKS

COORDINATE REFERENCE ϕ= 0° ϕ= 150° θ= 90°

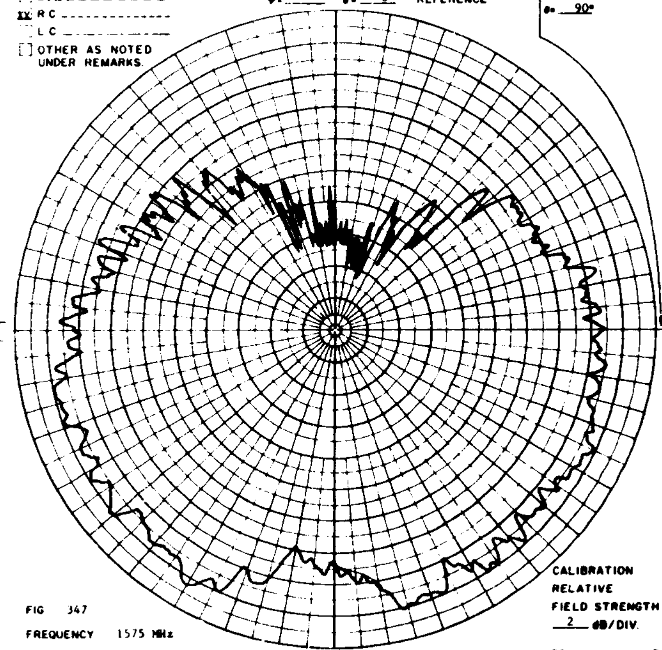

FIG 347
FREQUENCY 1575 MHz
ANTENNA GPS
REMARKS Solar Array (-Z) High Gain Antenna (-Z)

CALIBRATION RELATIVE FIELD STRENGTH 2 dB/DIV.
PSL№ 13055

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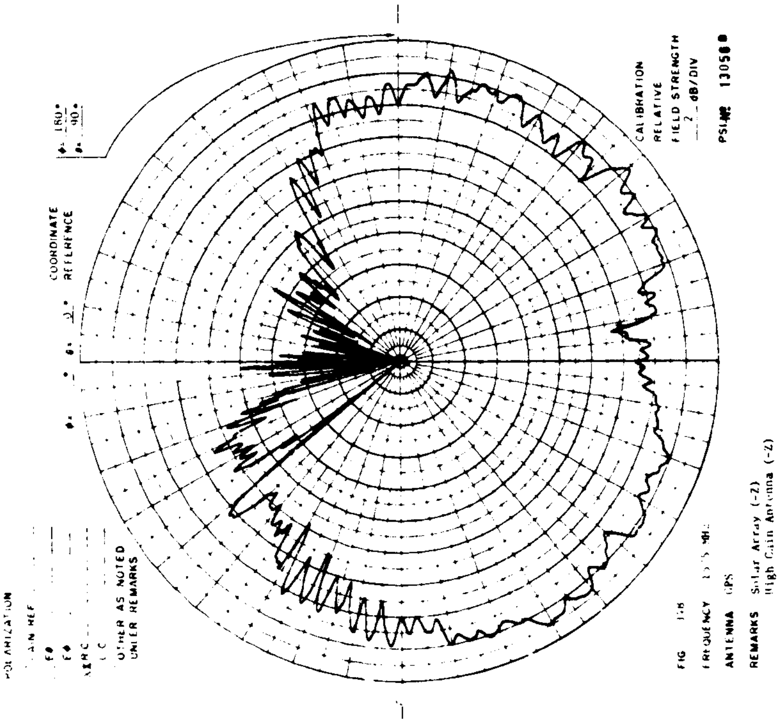

12.27 GPS Antenna - 1575 MHz
Antenna Patterns - Solar Array (+Z)

12.27.1 R.C. Polarization
High-Gain Antenna (-Z)
Antenna Range Leg Length - 3000 Feet

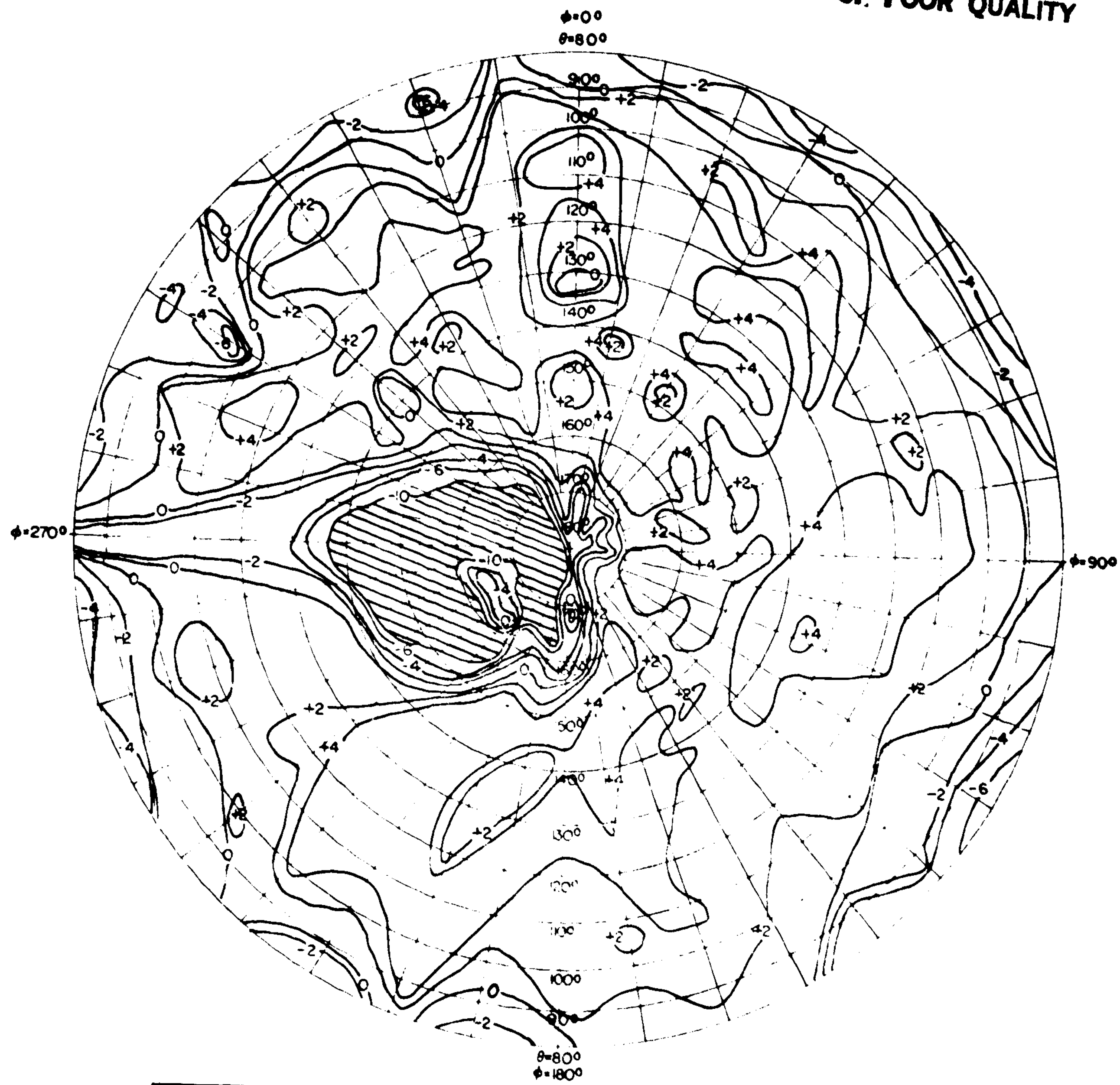

FIG. NO. 349 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT D	POLARIZATION	R.C.
ANTENNA	GPS	GAIN REFERENCE	SGH-L1 HORN
FREQUENCY	1575 MHz	ENGINEER	C.C. Post
MODEL SCALE	FULL		
REMARKS			
	SOLAR ARRAY (+Z)		
	HIGH GAIN ANTENNA (-Z)		

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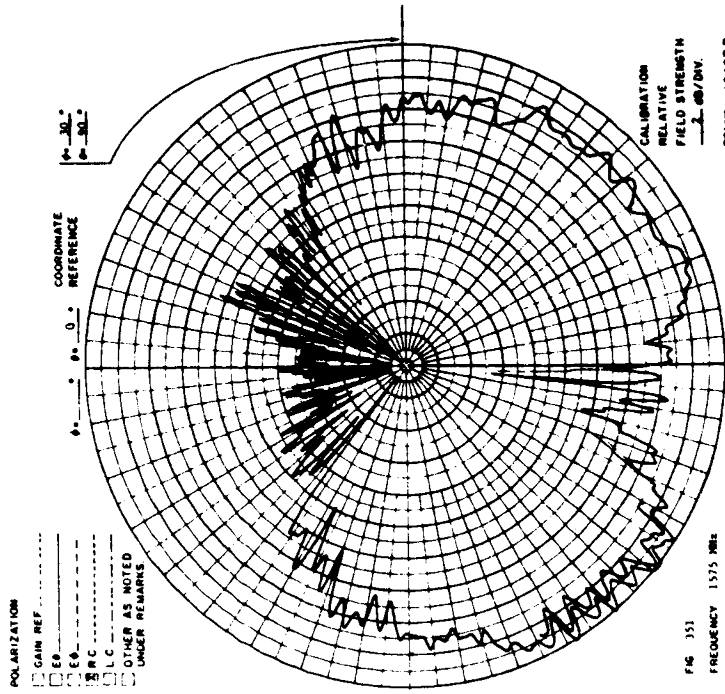

FIG 351
FREQUENCY 1575 MHz
ANTENNA GPS
REMARKS Solar Array (+2) High Gain Antenna (-2)

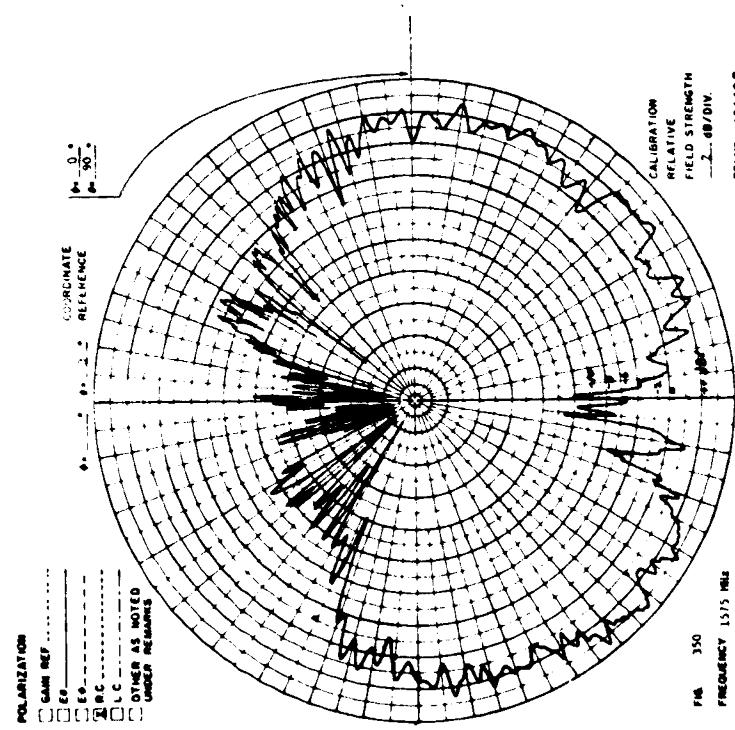

FIG 350
FREQUENCY 1575 MHz
ANTENNA GPS
REMARKS Solar Array (+2) High Gain Antenna (-2)

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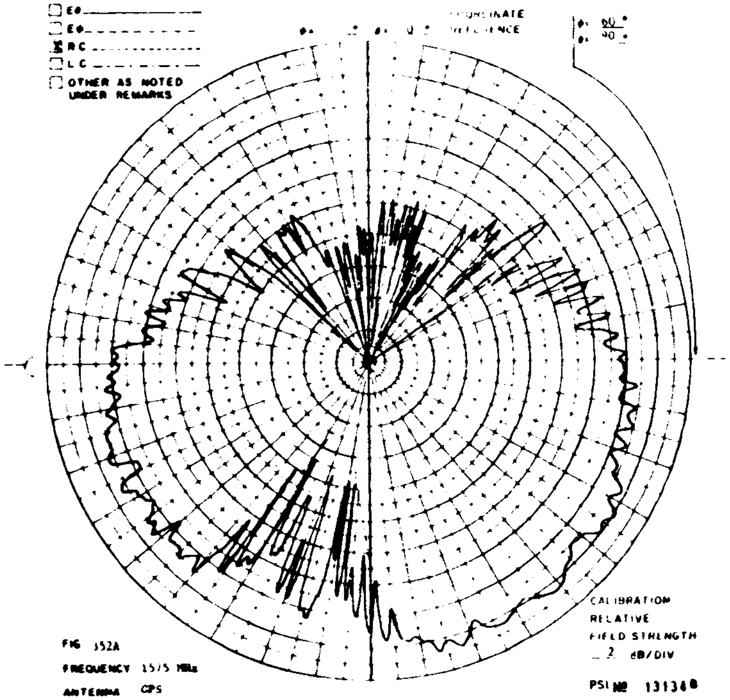


FIG 352A
FREQUENCY 1575 MHz
ANTENNA GPS
REMARKS Solar Array (+Z)
High Gain Antenna (-Z)

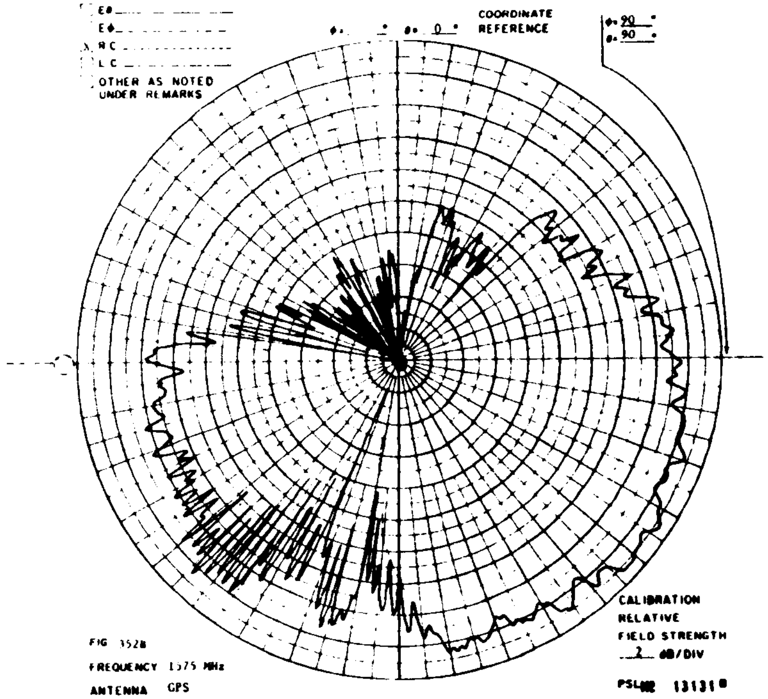
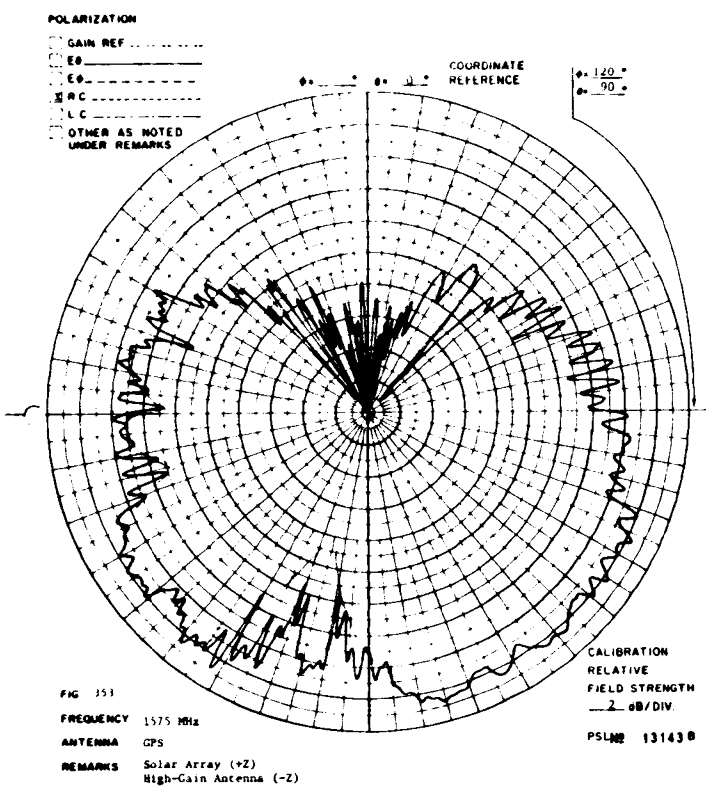
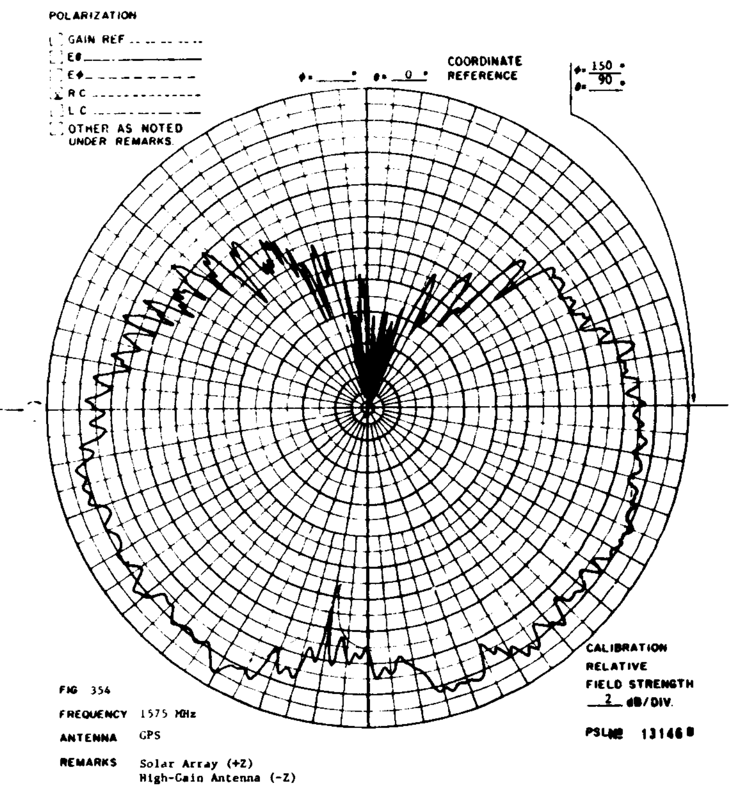


FIG 352B
FREQUENCY 1575 MHz
ANTENNA GPS
REMARKS Solar Array (+Z)
High-Gain Antenna (-Z)


POLARIZATION
GAIN REF
Eθ
Eϕ
RC
LC
OTHER AS NOTED UNDER REMARKS
COORDINATE REFERENCE
ϕ = 120°
θ = 90°
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.
PSL№ 13143B
FIG 353
FREQUENCY 1575 MHz
ANTENNA GPS
REMARKS Solar Array (+Z)
High-Gain Antenna (-Z)


POLARIZATION
GAIN REF
Eθ
Eϕ
RC
LC
OTHER AS NOTED UNDER REMARKS
θ = 0°
COORDINATE REFERENCE
ϕ = 150°
θ = 90°
CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.
PSL№ 13146B
FIG 354
FREQUENCY 1575 MHz
ANTENNA GPS
REMARKS Solar Array (+Z)
High-Gain Antenna (-Z)

12.28 X-Band Shaped Beam Antenna Unit No. 2
Nine Frequency Special Survey
Antenna Patterns - Solar Array Removed

12.28.1 R.C. Polarization
Solar Array Removed
High-Gain Antenna Removed
Antenna RAnge Leg Length - 160 Feet
Cooler Door Open

12.28.2 Frequencies Survey:

8127.5 MHz	8233.75 MHz
8148.75 MHz	8255.0 MHz
8170.0 MHz	8276.25 MHz
8191.25 MHz	8297.5 MHz
8212.5 MHz	

12.28.3 $\phi = 90°$ scan only for each frequency

12.28.4 Power normalized on each pattern at $(\phi,\theta) = (90°,64°)$

12.28.5 The TRW Company shipped two different breadboard models to NMSU/PSL for the tests. These are designated Model No. 1 and Model No. 2. Model No. 2 is an improved radiator compared to Model No. 1. Some part of the measurements reported herein utilzed one or the other of these antennas as indicated in the section titles. Free space data and gains were measured for both of these antennas.

12.28. 6 No effects of opening and closing the thematic door were observed in the survey data measured.

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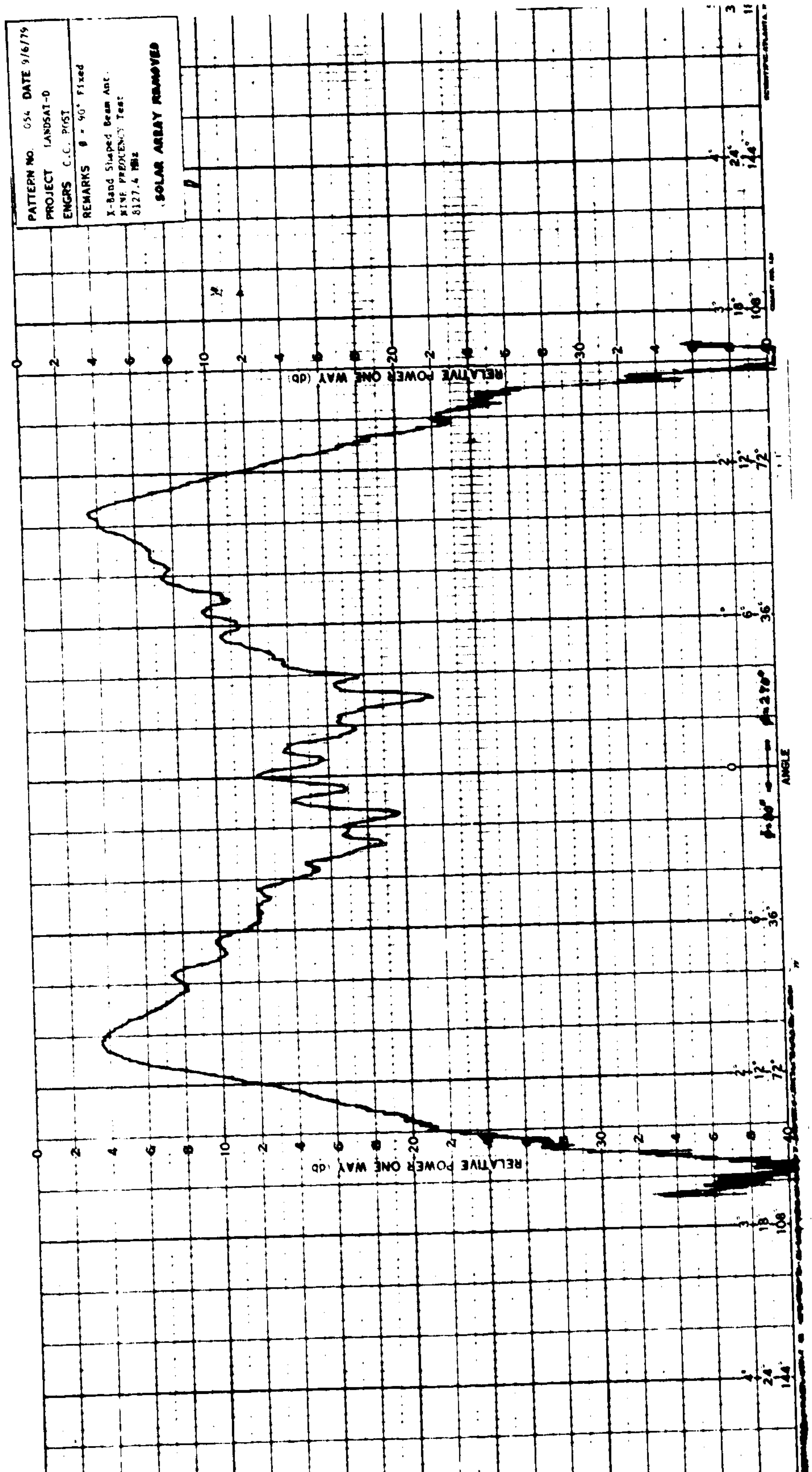

Fig. 355

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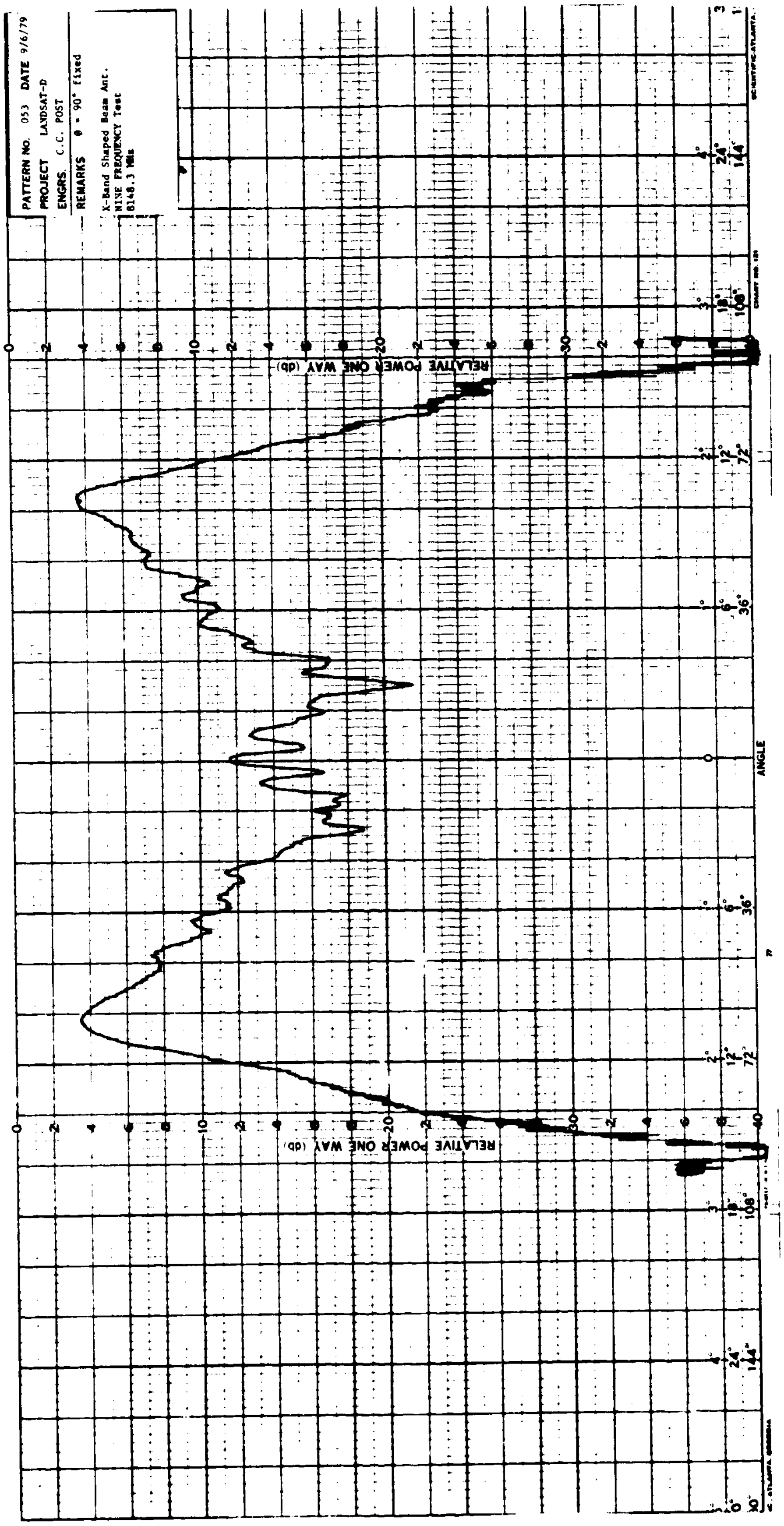

Fig. 356

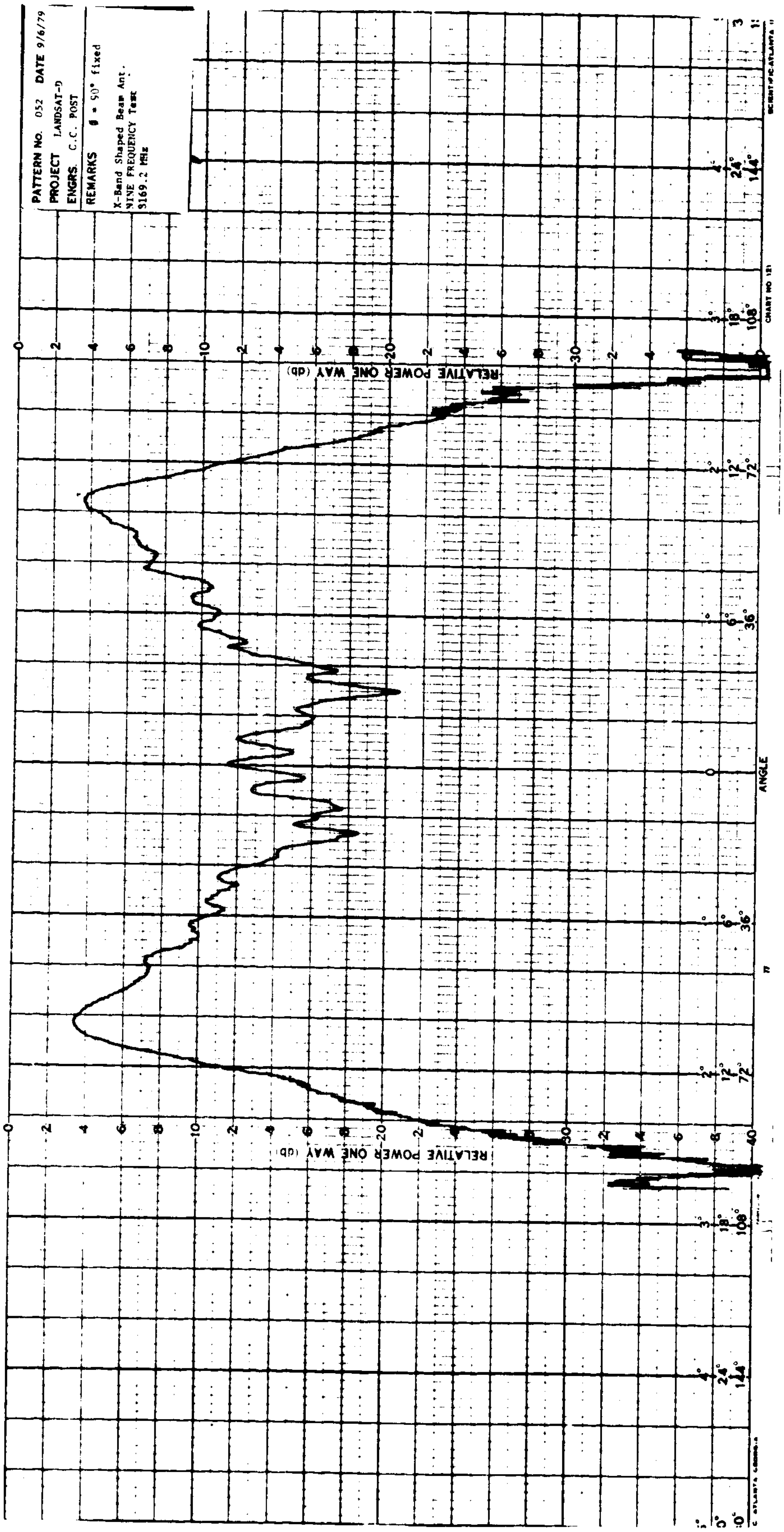
PATTERN NO. 052 DATE 9/6/79
PROJECT LANDSAT-D
ENGRS. C.C. POST
REMARKS
X-Band Shaped Beam Ant.
NINE FREQUENCY Test
RELATIVE POWER ONE WAY (db)
ANGLE

Fig. 357

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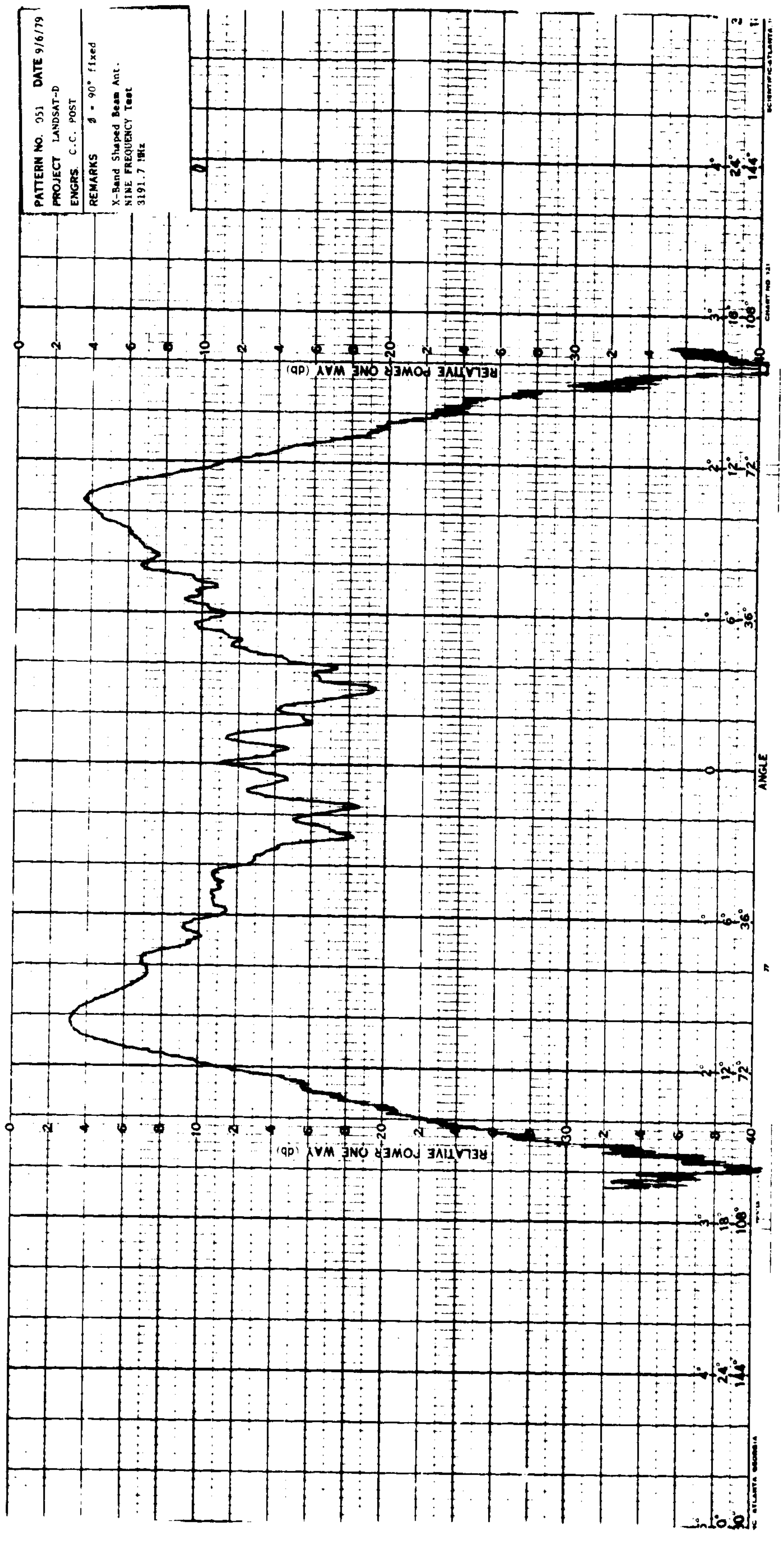

Fig. 358

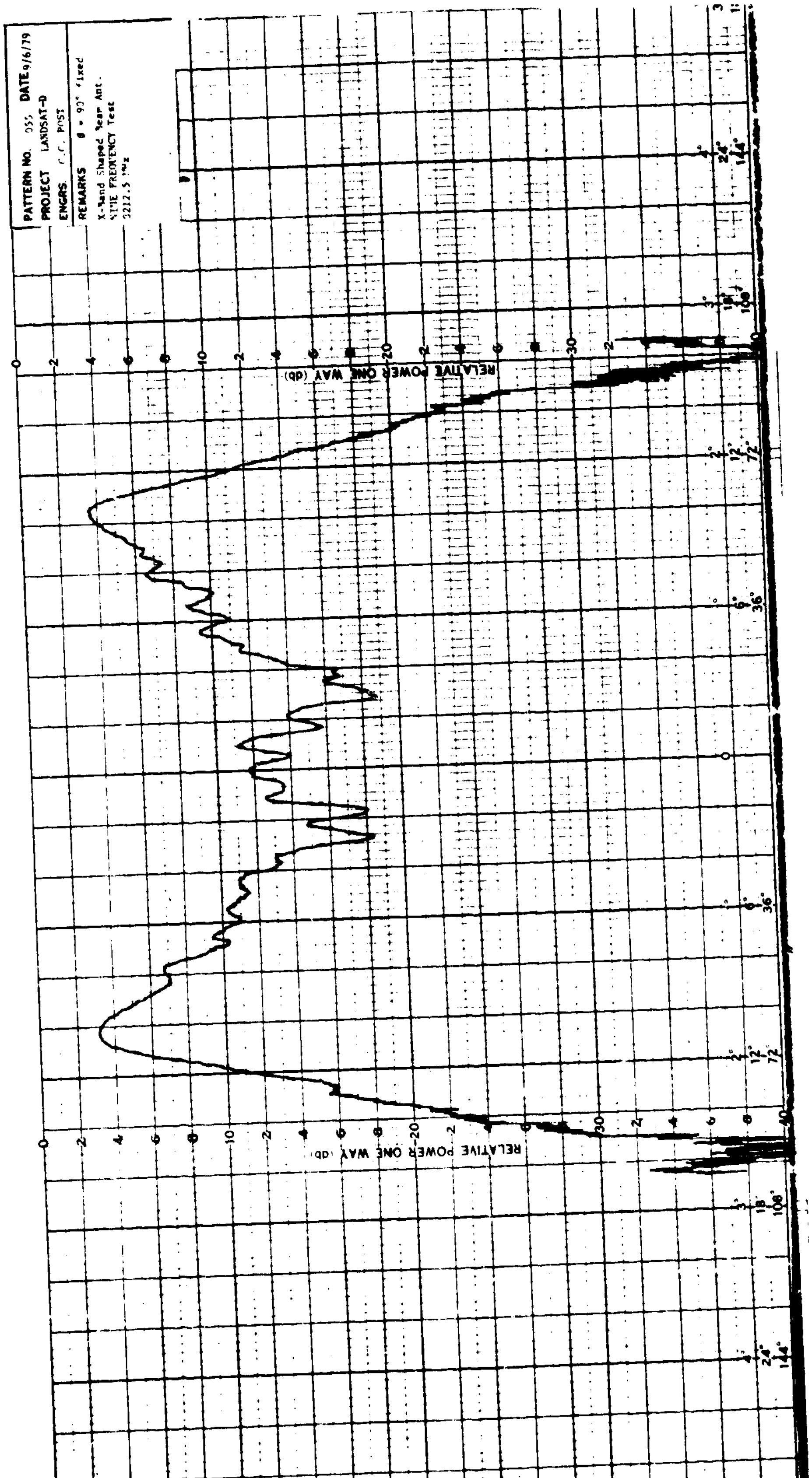
PATTERN NO.
DATE
PROJECT LANDSAT-D
ENGRS.
REMARKS
RELATIVE POWER ONE WAY (db)
RELATIVE POWER ONE WAY (db)

Fig. 359

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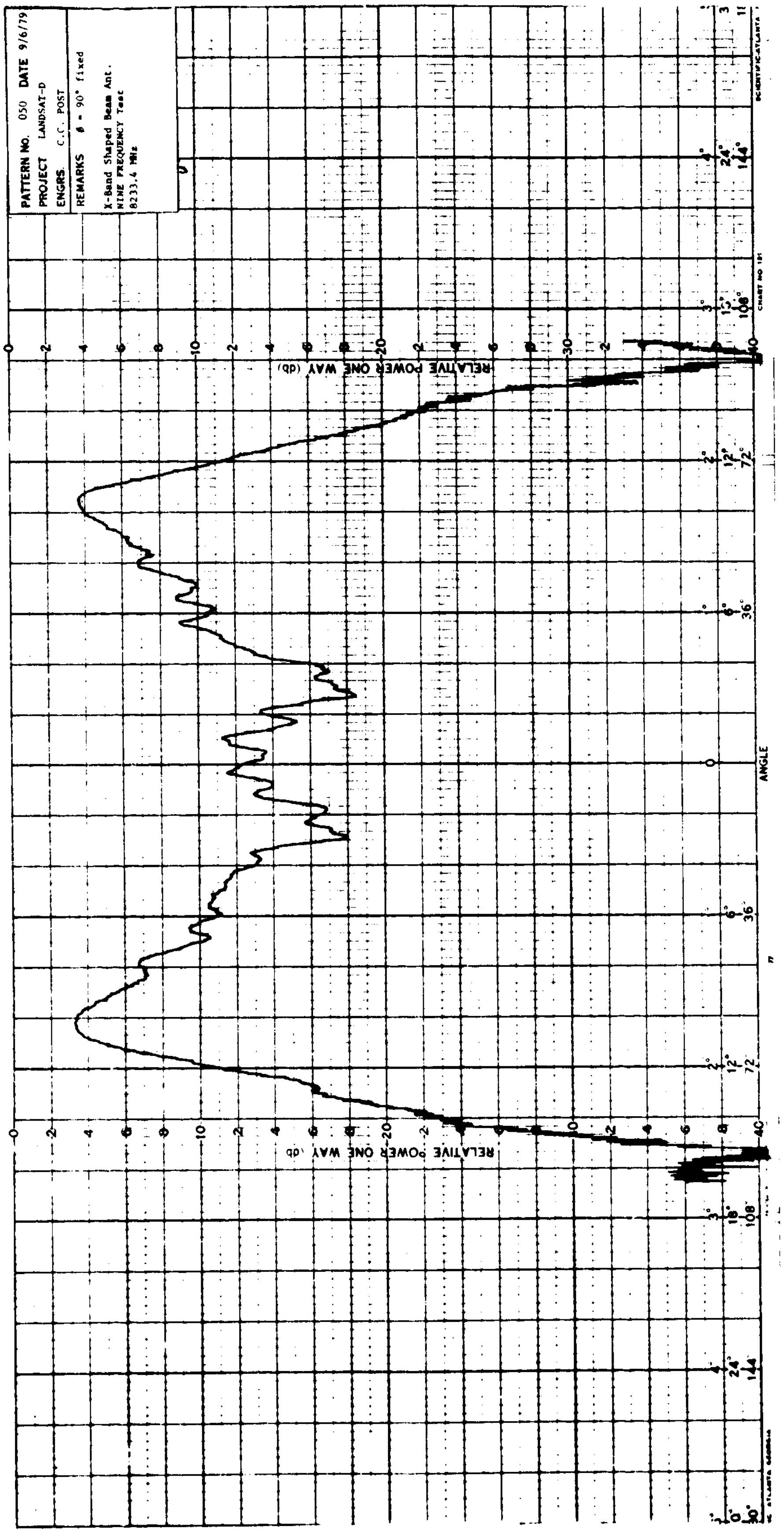

Fig. 360

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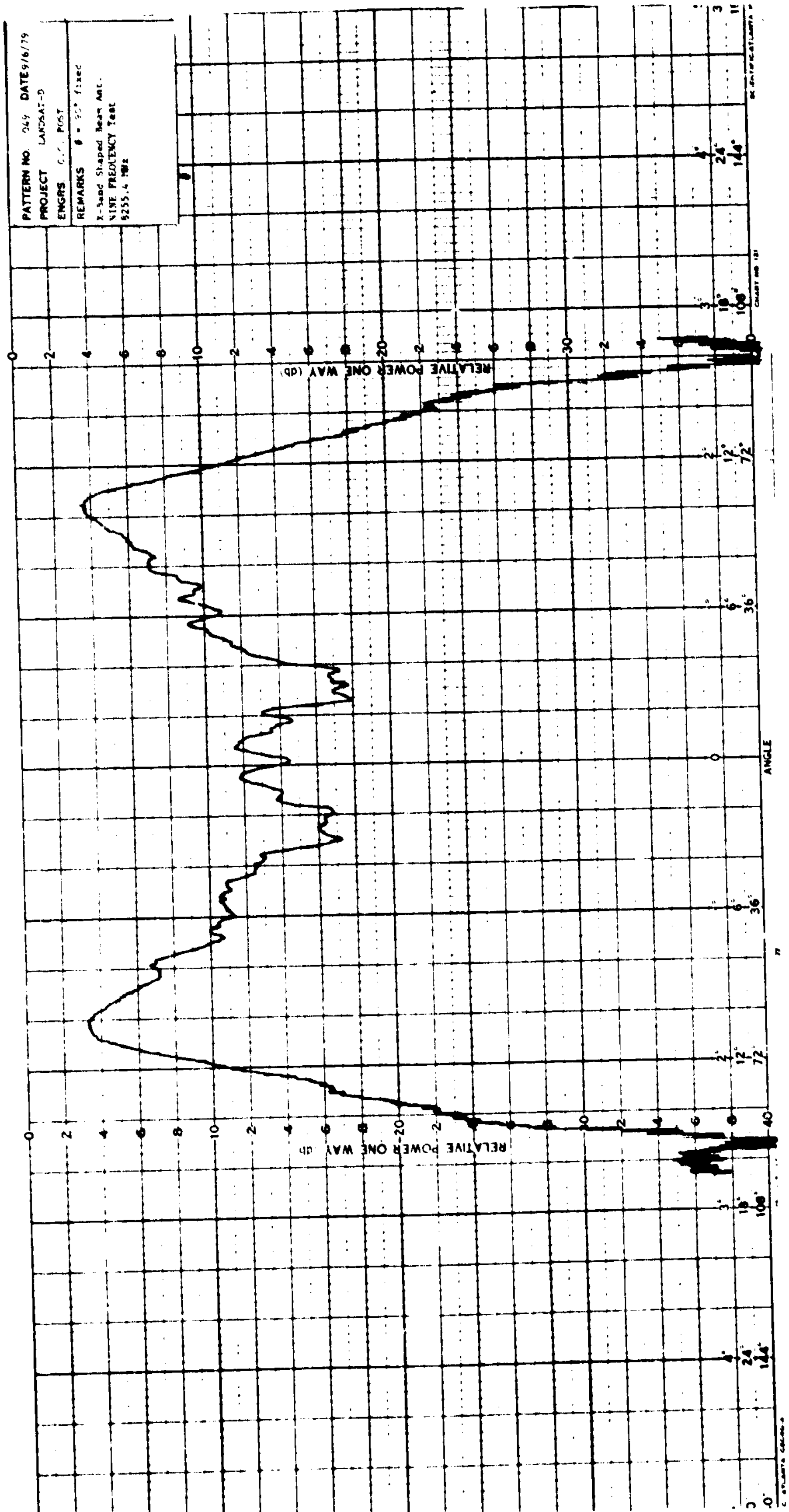

Fig. 361

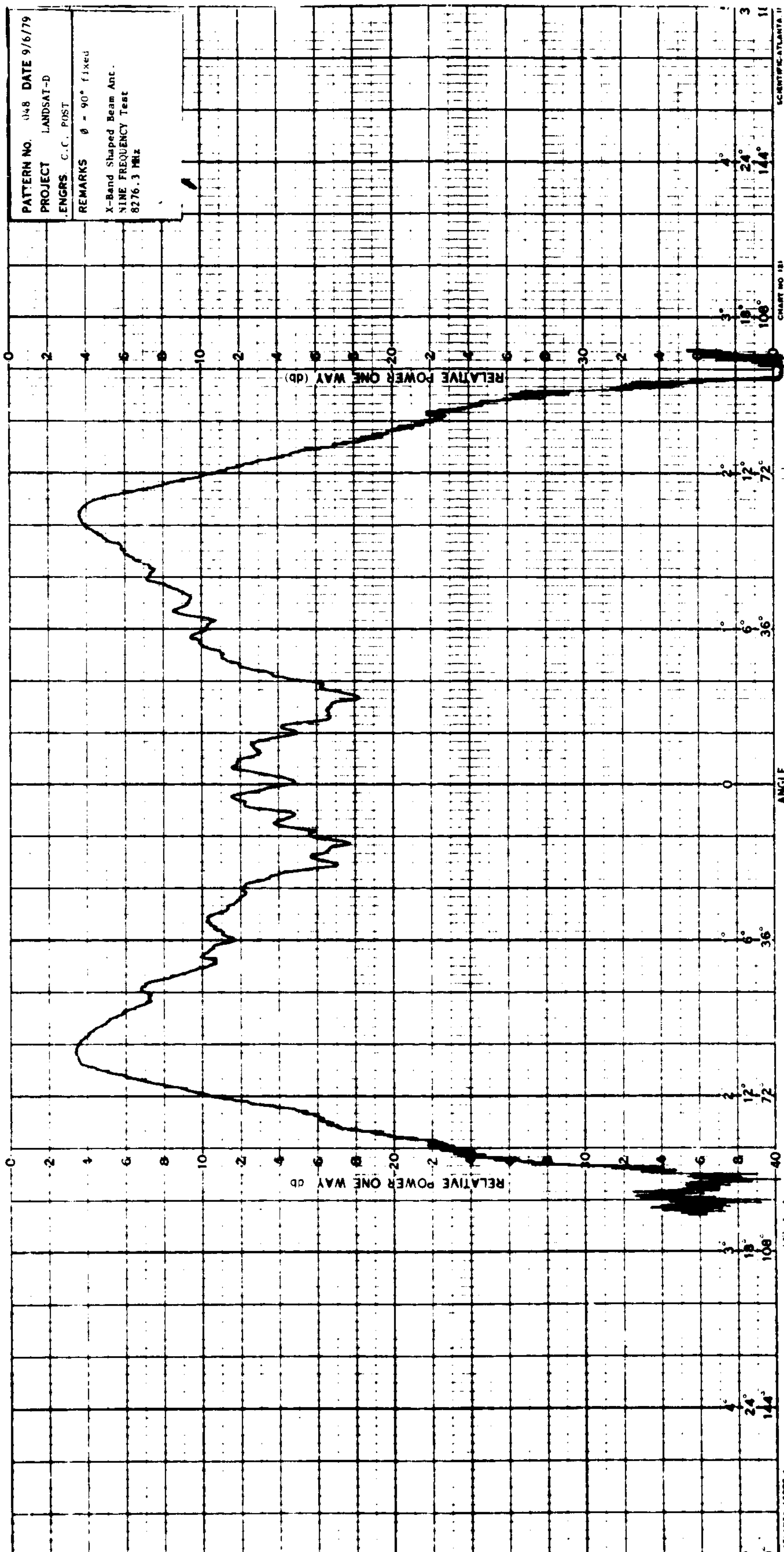
PATTERN NO. 048 DATE 9/6/79
PROJECT LANDSAT-D
ENGRS. C.C. POST
REMARKS ø = 90° fixed
X-Band Shaped Beam Ant.
NINE FREQUENCY Test
8276.3 MHz
RELATIVE POWER ONE WAY (db)
ANGLE

Fig. 362

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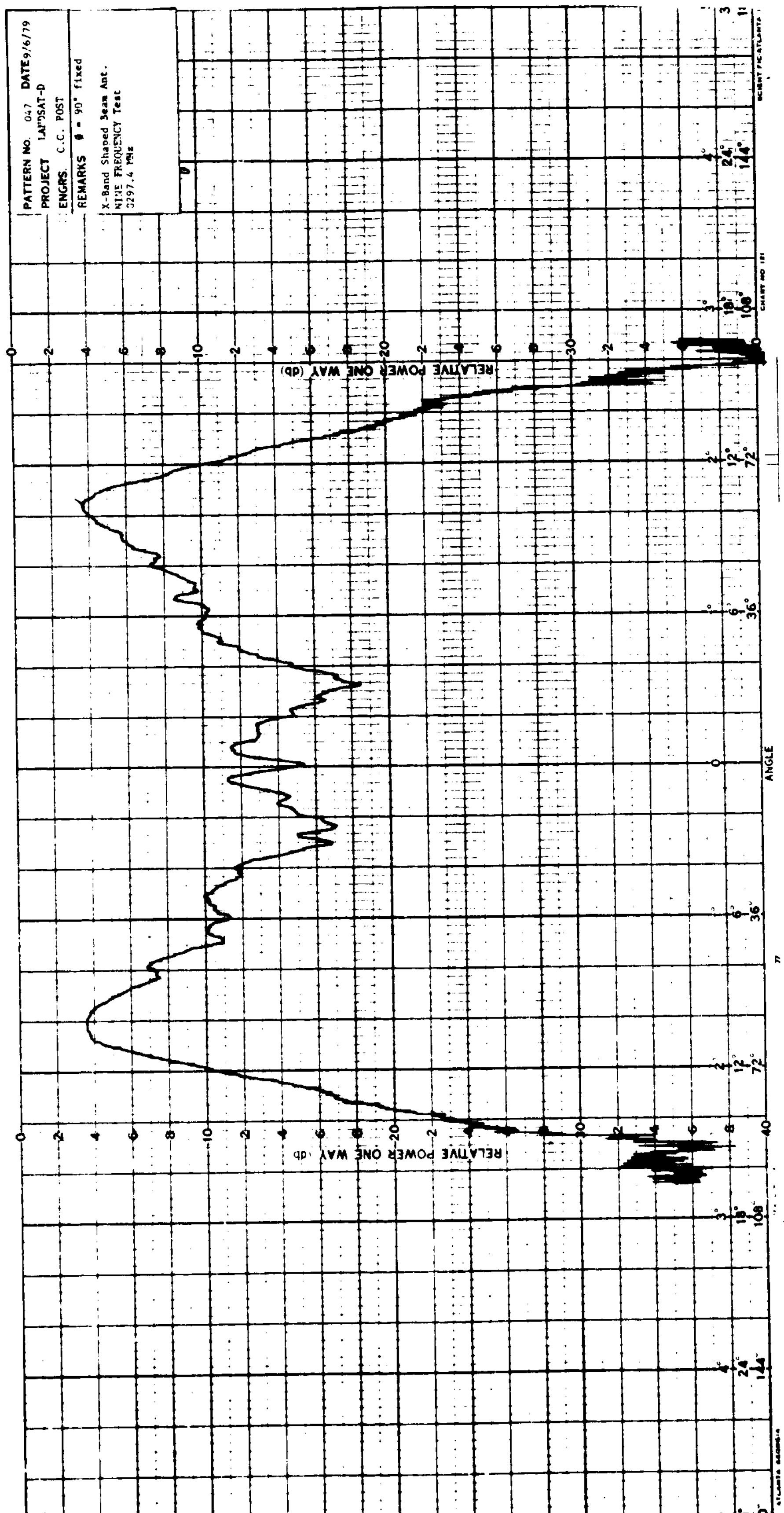

Fig. 363

12.29 X-Band Shaped Beam Antenna Model No. 1
Survey at ϕ = 90° Scan Rolling Solar Array

12.29.1 A survey at the ϕ = 90° Scan at 8212.5 MHz constant was made while the solar array was rolled in small increments around the (-Z) direction. Figures 364 through 368 show that interference from reflections off the solar array occurs in small angular positions of the solar array.

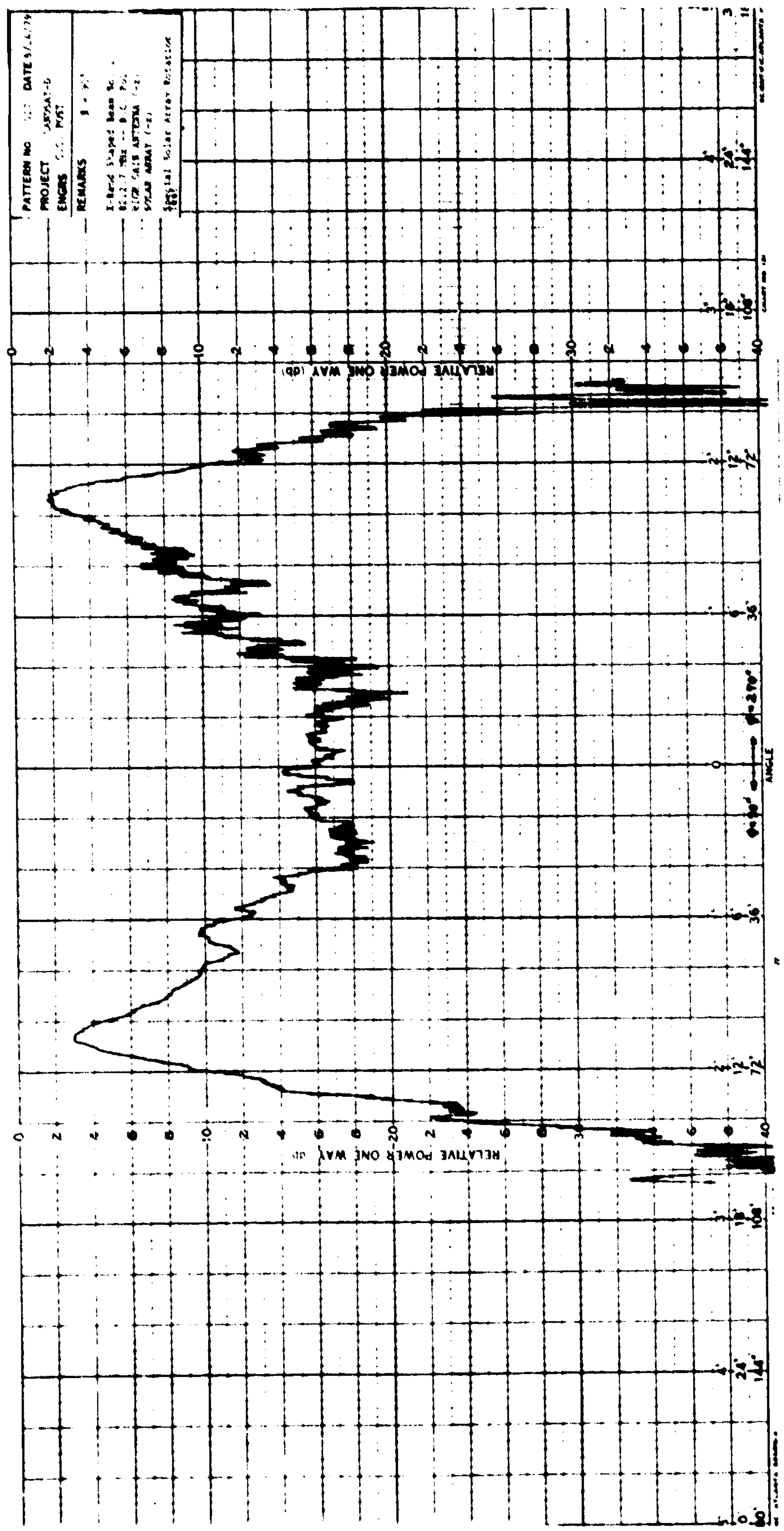

Fig. 364

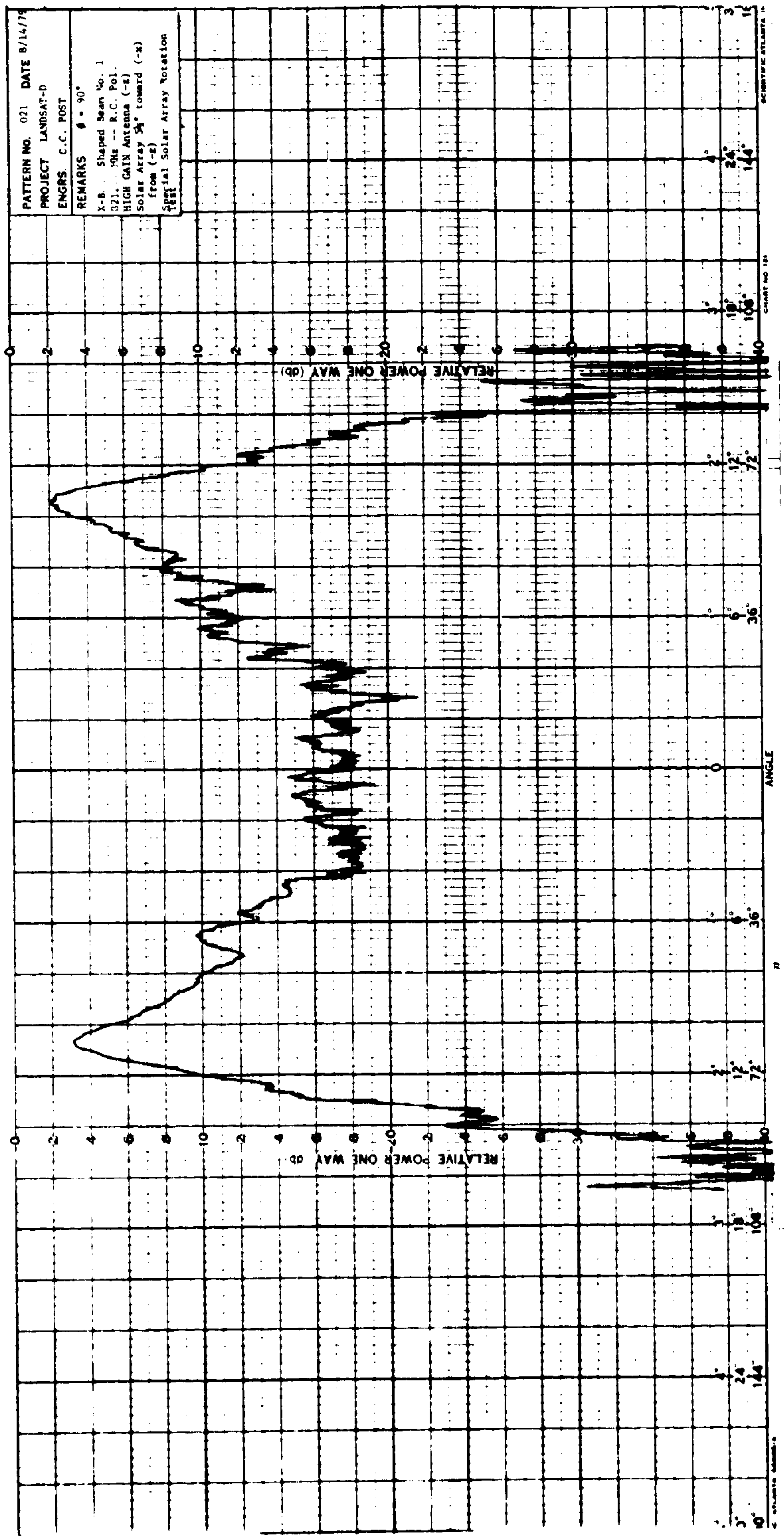
PATTERN NO. 021 DATE 8/14/79
PROJECT LANDSAT-D
ENGRS. C.C. POST
REMARKS ϕ = 90°
X-B. Shaped Beam No. 1
321. MHz -- R.C. Pol.
HIGH GAIN Antenna (-z)
Solar Array 5° toward (-x)
from (-z)
Special Solar Array Rotation
TEST
RELATIVE POWER ONE WAY (db)
RELATIVE POWER ONE WAY db
ANGLE

Fig. 365

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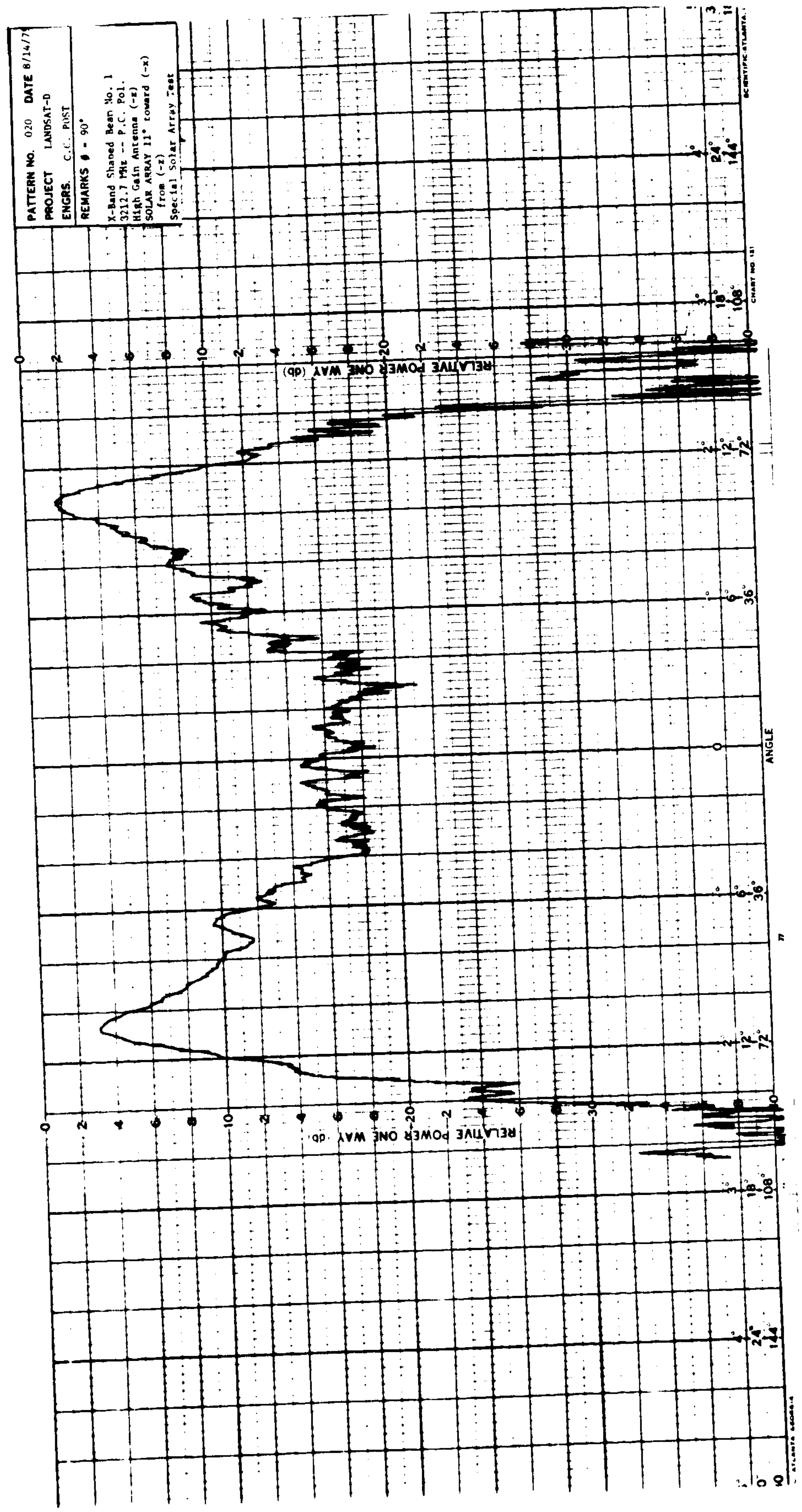

Fig. 366

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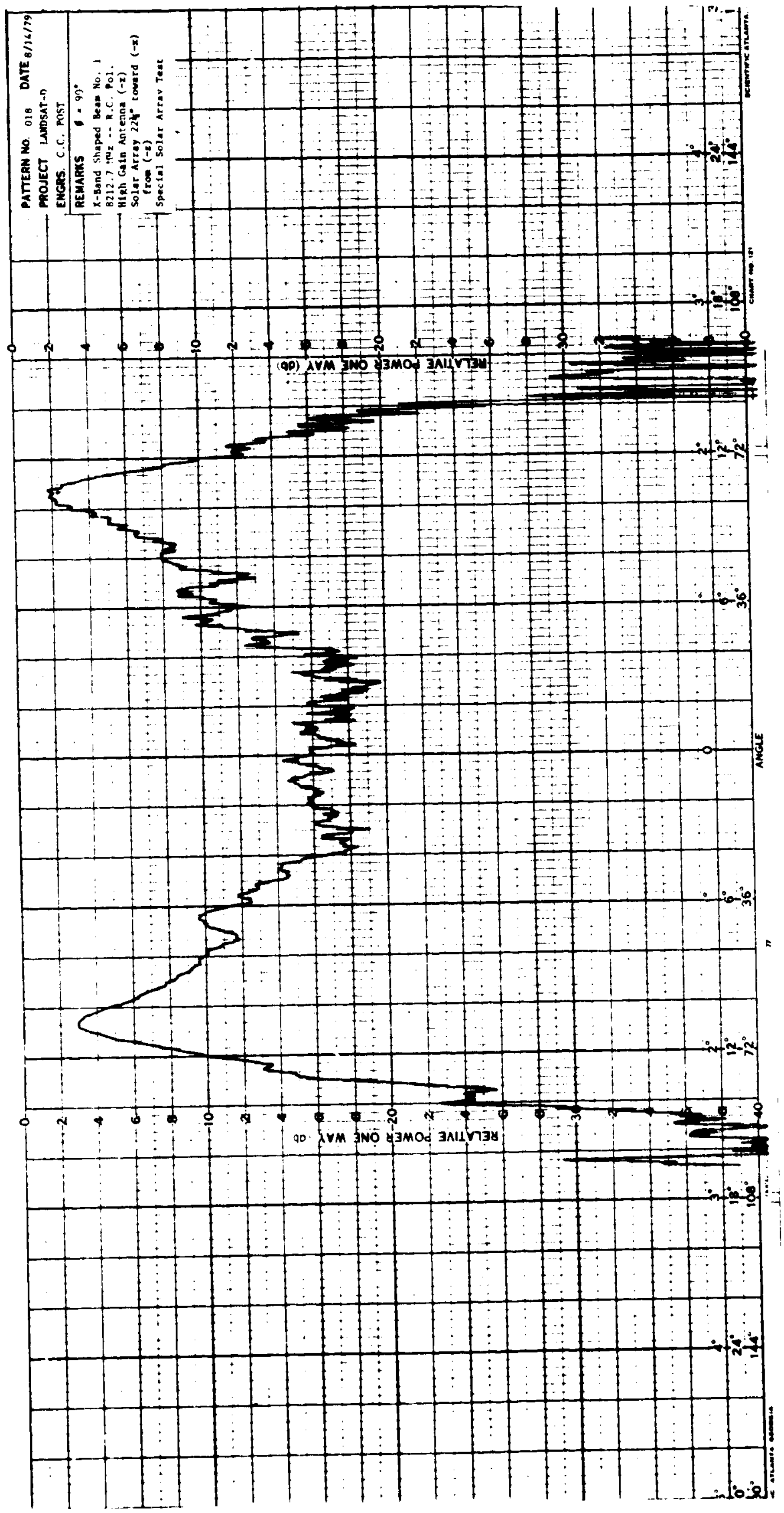

Fig. 367

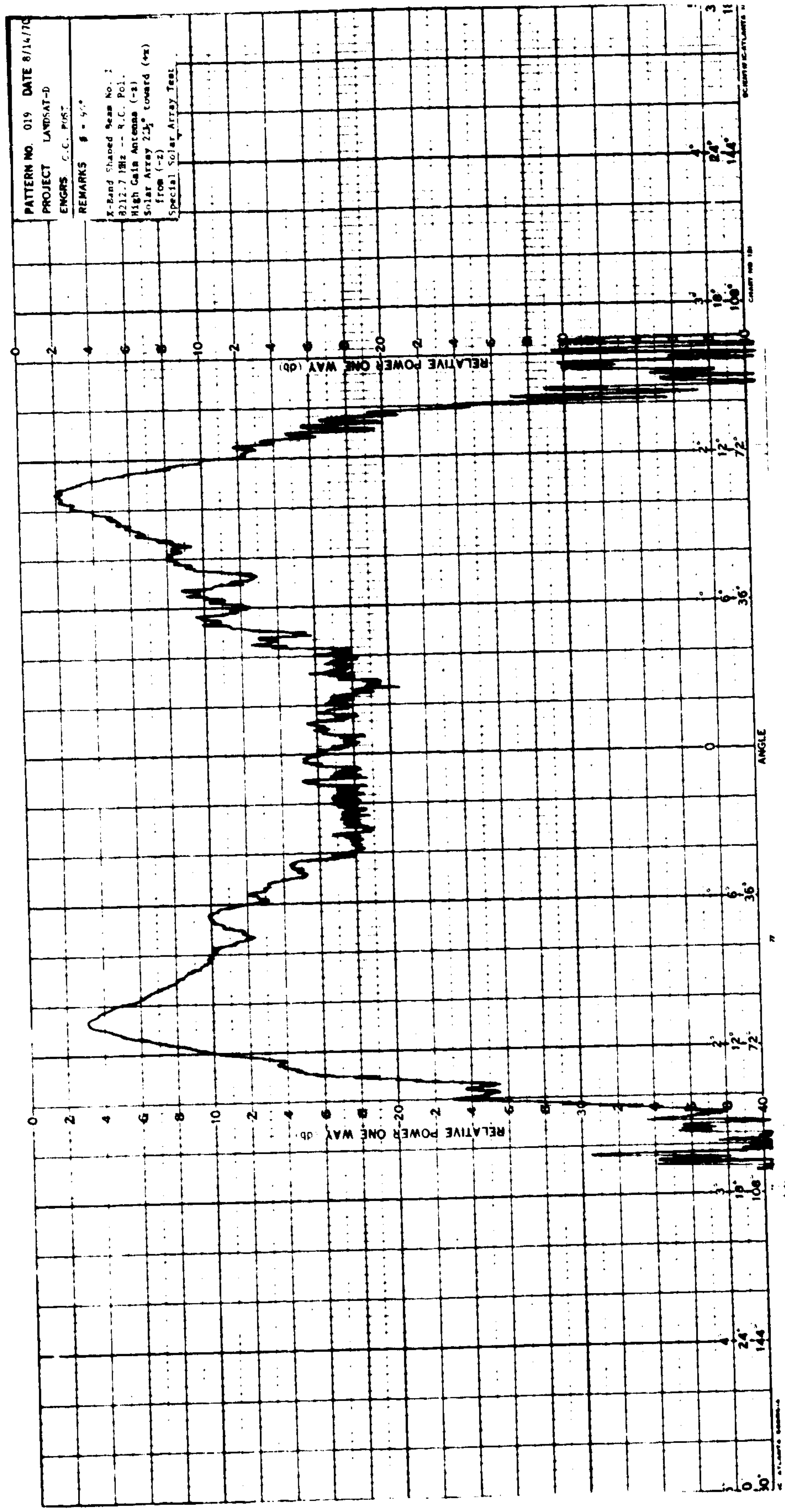
PATTERN NO. 019 DATE 8/14/7
PROJECT LANDSAT-D
ENGRS
REMARKS
X-Band Shaped Beam No. 2
High Gain Antenna
Special Solar Array Test
RELATIVE POWER ONE WAY (db)
ANGLE
RELATIVE POWER ONE WAY db

Fig. 368

12.30 X-Band Shaped Beam Antenna Model No. 2 - 8212.5 MHz
Antenna Patterns - Solar Array and High-Gain Antenna Removed

12.30.1 R.C. Polarization
Solar Array Removed
High-Gain Antenna Removed
Antenna Range Leg Length - 160 Feet

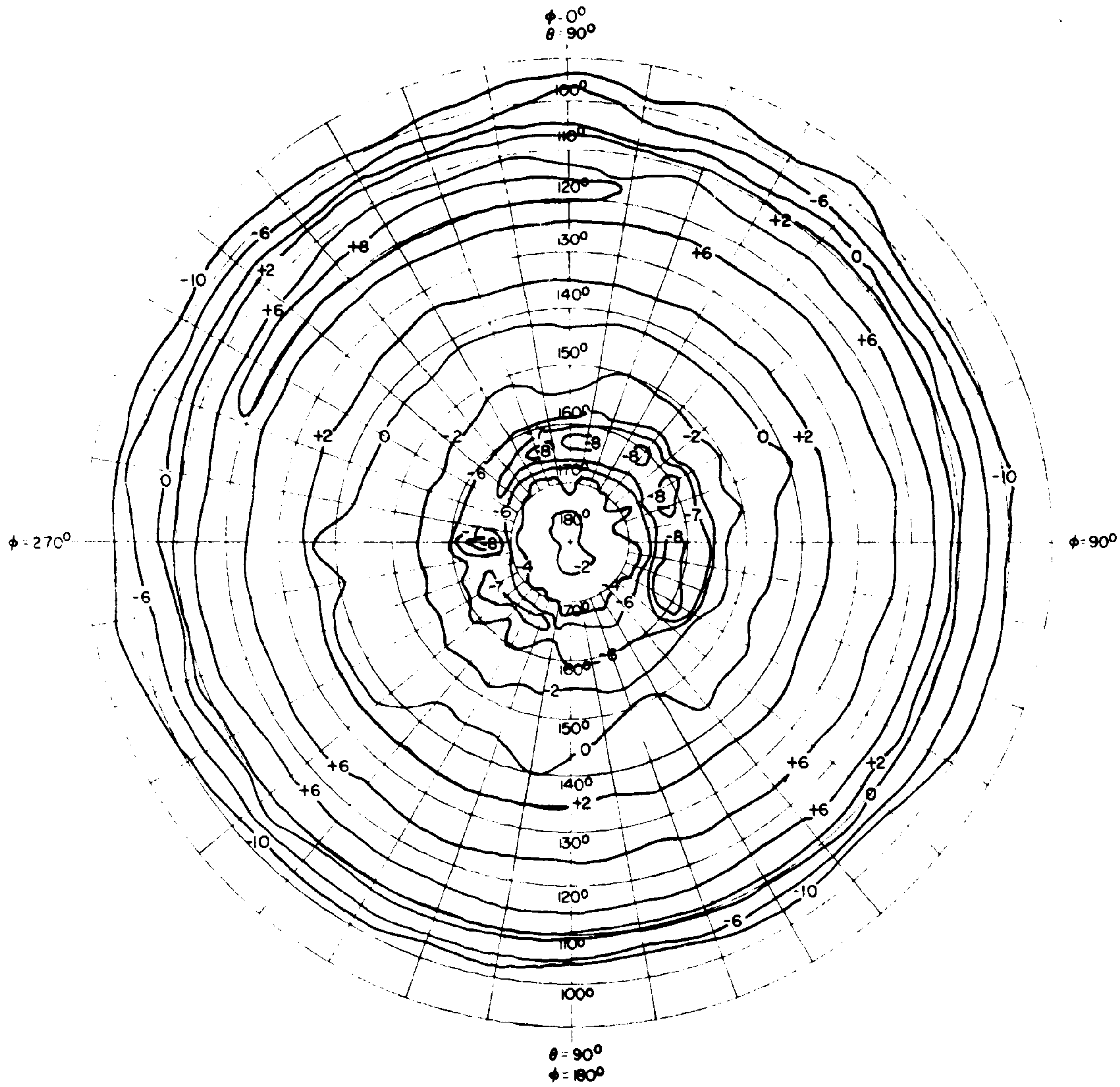

FIG. NO. 369 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT-D	POLARIZATION	R.C.
ANTENNA	X Band Shaped Beam	GAIN REFERENCE	SGH 5.8 HORN
FREQUENCY	8212.5 MHz	ENGINEER	C.C. Post
MODEL SCALE	FULL		
REMARKS			
	SOLAR PANEL REMOVED		
	HIGH-GAIN ANTENNA REMOVED		
	COOLER DOOR OPEN		

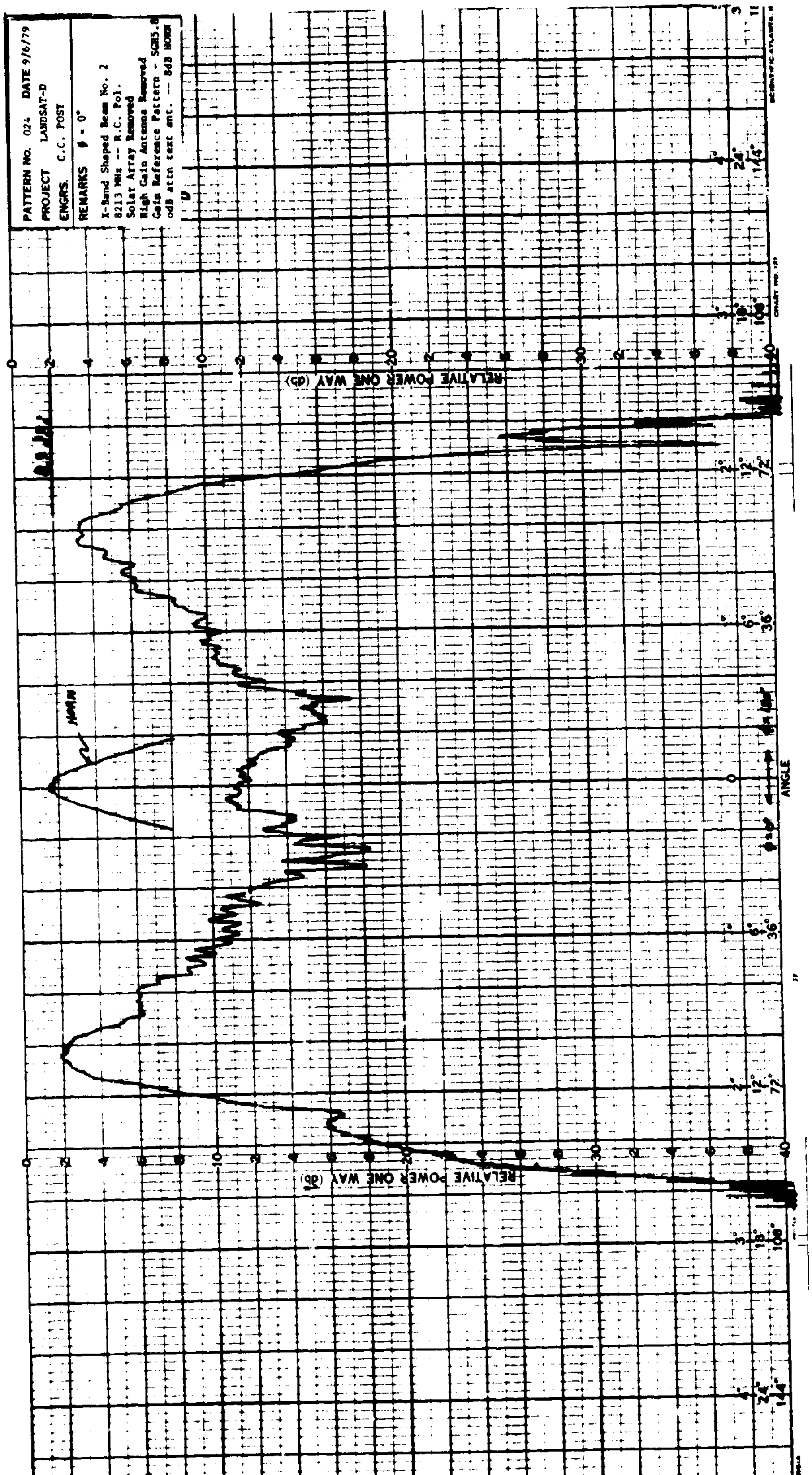

Fig. 370A Gain Reference Pattern

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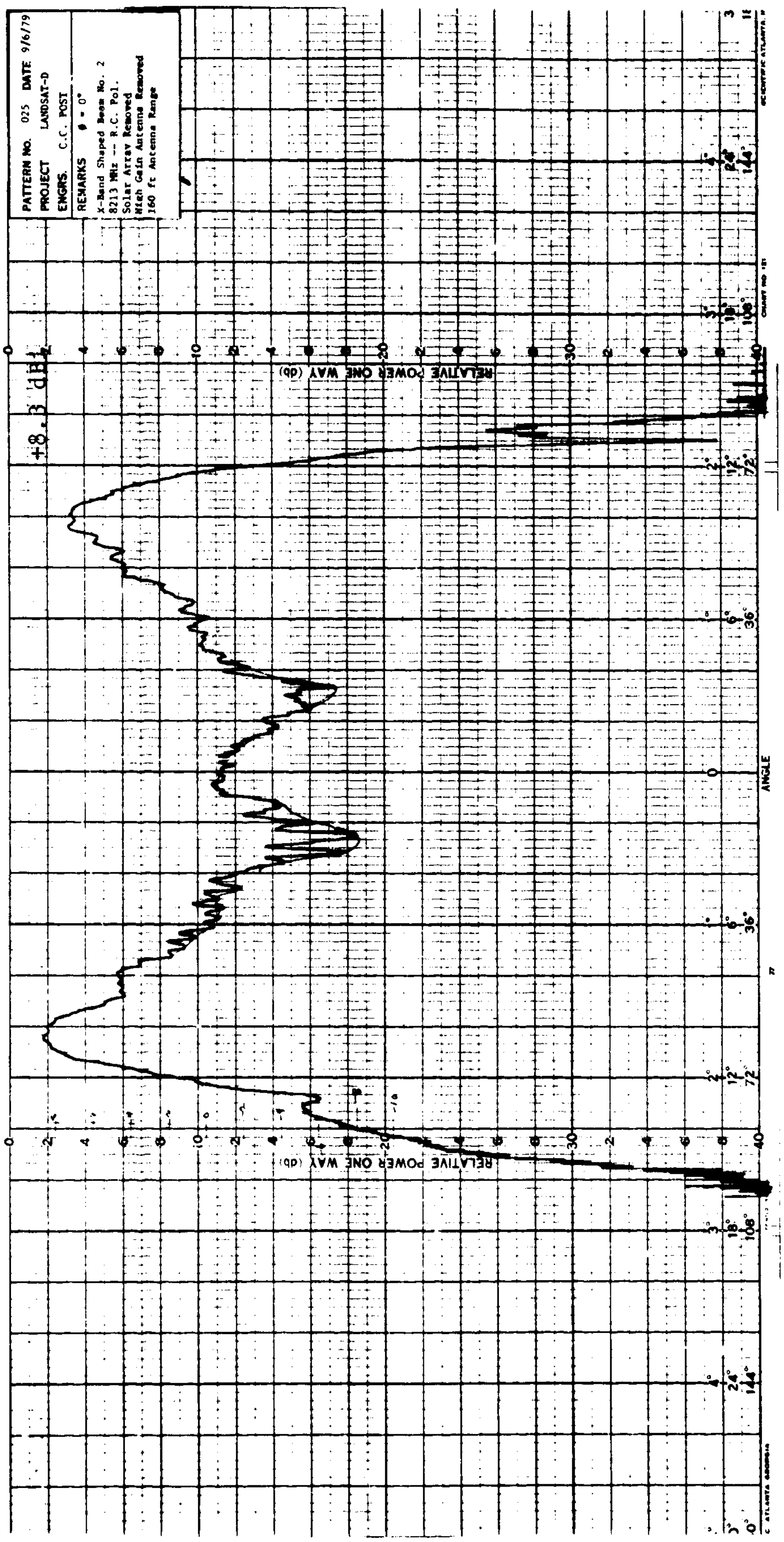

Fig. 370B

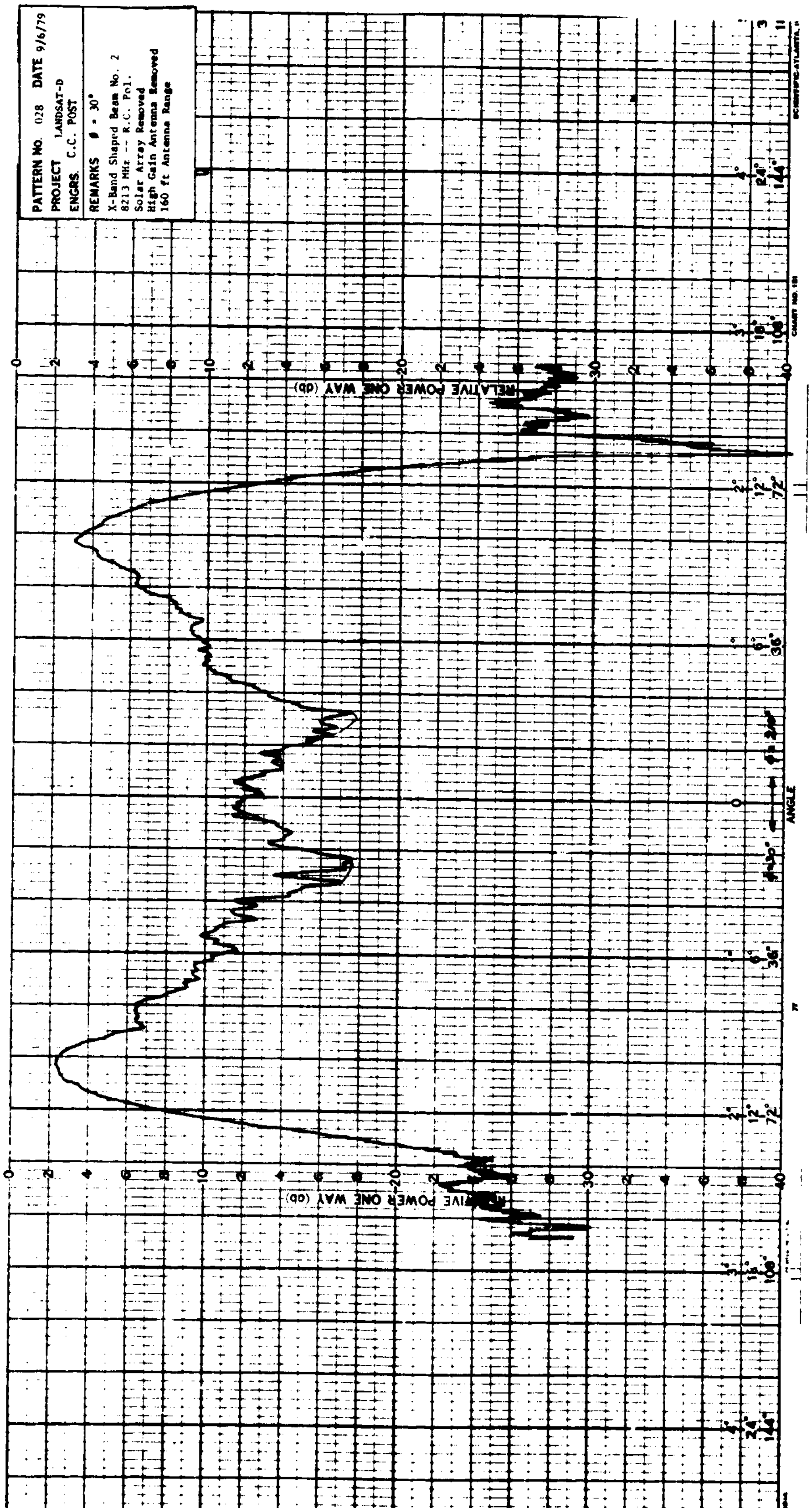
PATTERN NO. 028 DATE 9/6/79
PROJECT LANDSAT-D
ENGRS. C.C. POST
REMARKS ϕ = 30°
X-Band Shaped Beam No. 2
8213 MHz -- R.C. Pol.
Solar Array Removed
High Gain Antenna Removed
160 ft Antenna Range
RELATIVE POWER ONE WAY (db)
ANGLE

Fig. 371

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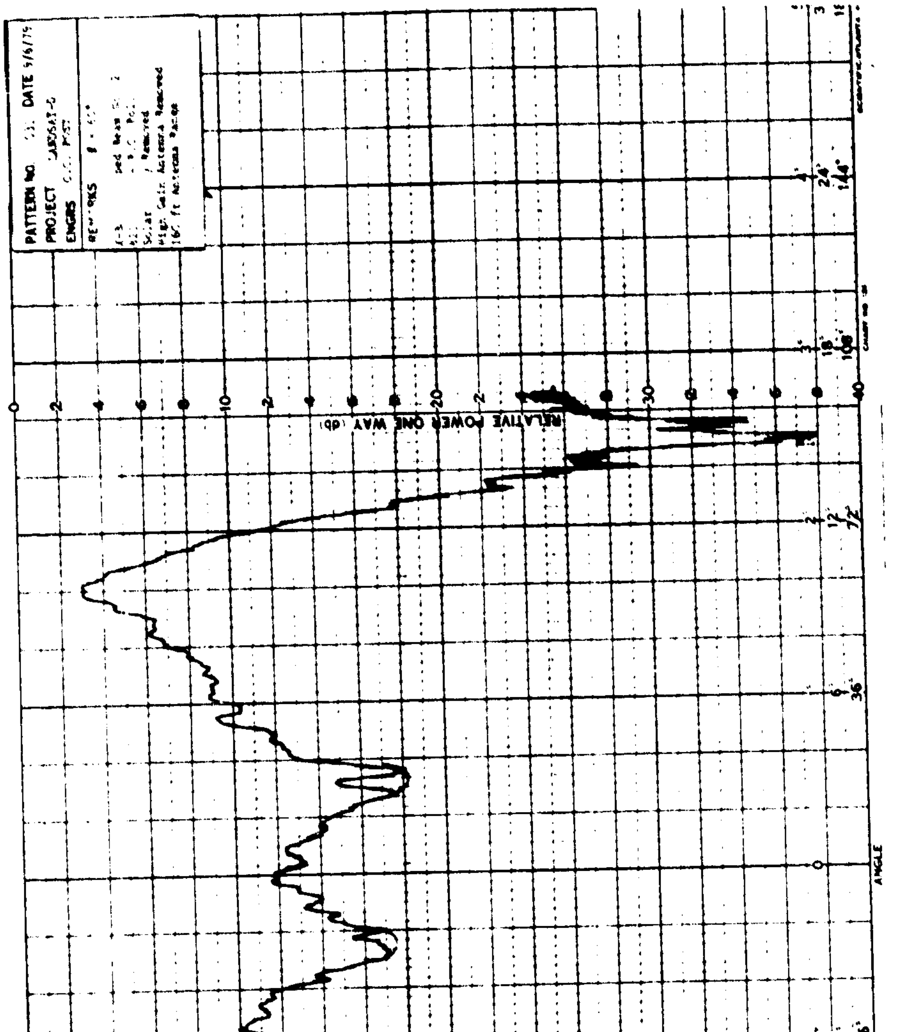

Fig. 372

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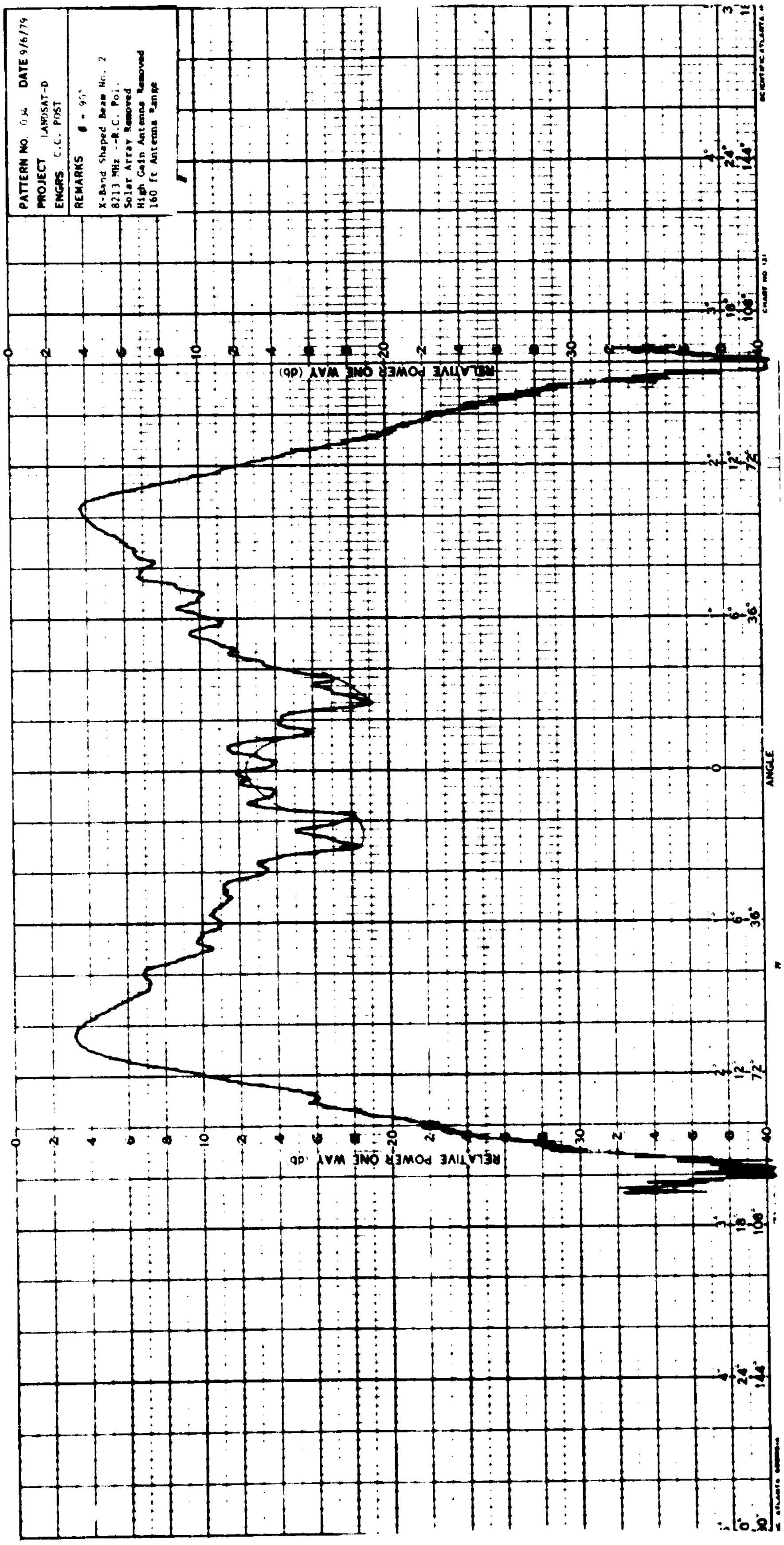

Fig. 373

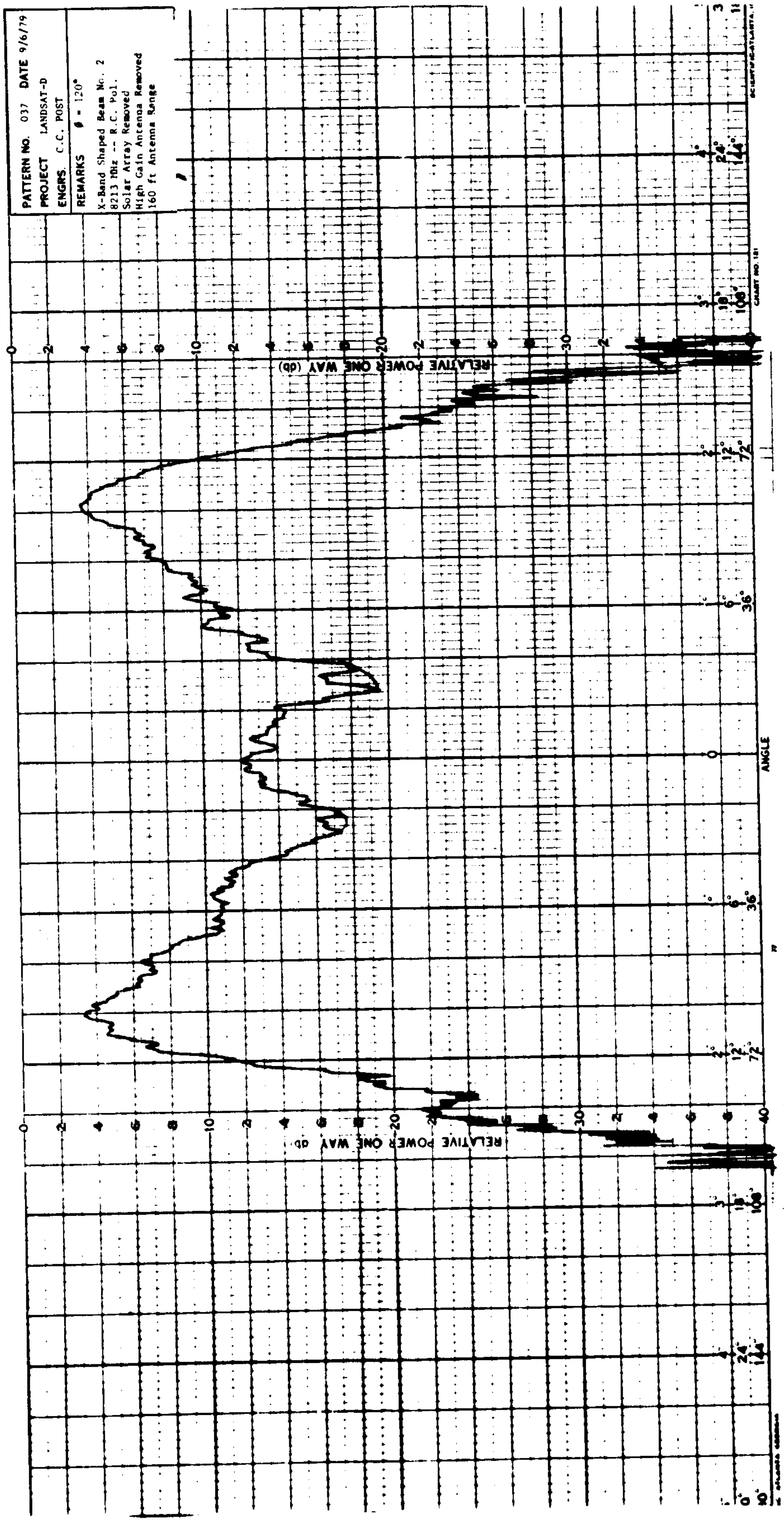
PATTERN NO. 037 DATE 9/6/79
PROJECT LANDSAT-D
ENGRS. C.C. POST
REMARKS ϕ = 120°
X-Band Shaped Beam No. 2
8213 MHz -- R.C. Pol.
Solar Array Removed
High Gain Antenna Removed
160 ft Antenna Range
RELATIVE POWER ONE WAY (db)
RELATIVE POWER ONE WAY db
ANGLE

Fig. 374

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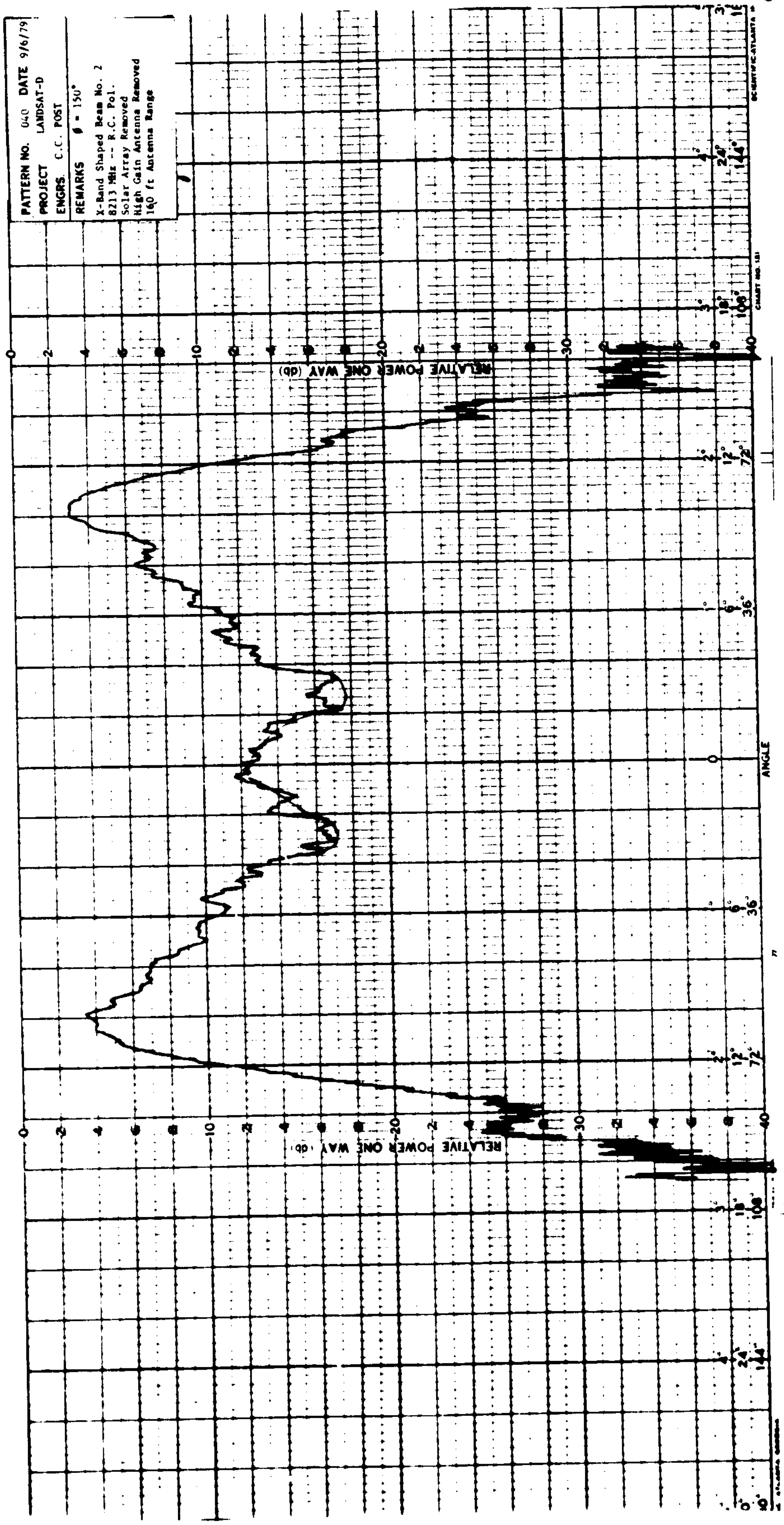

Fig. 375

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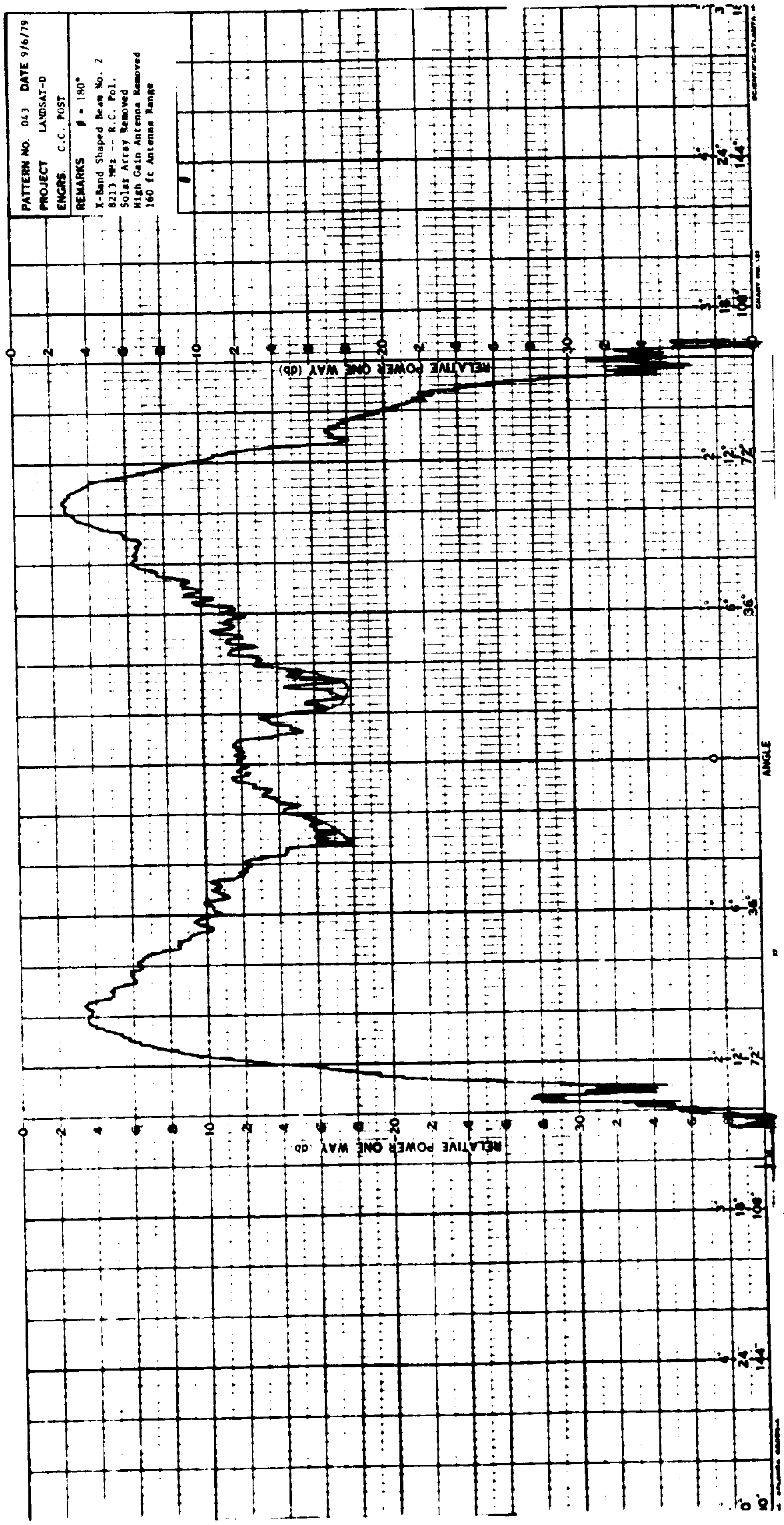

Fig. 376

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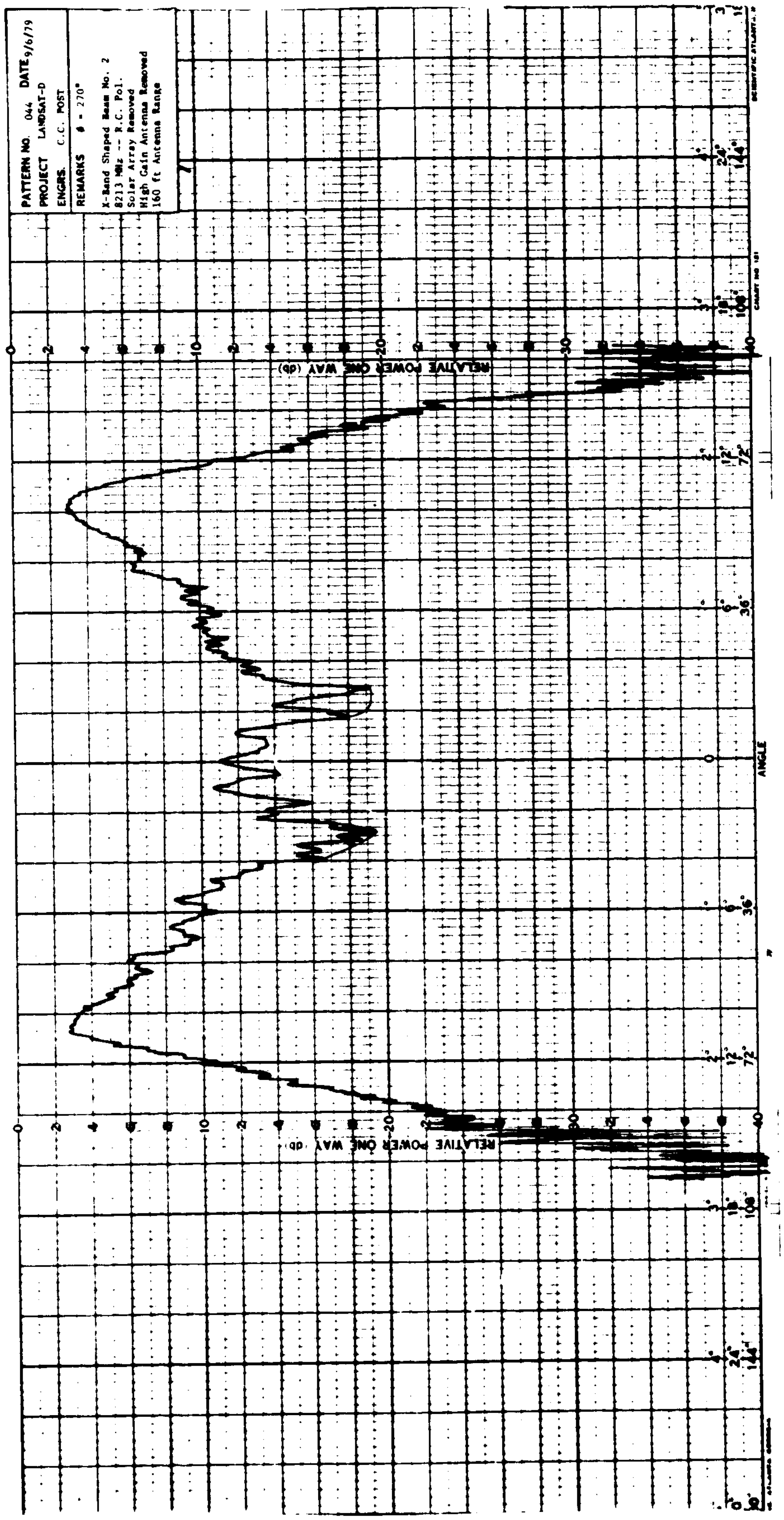

Fig. 377

13.0 ALTERNATE ORBIT CONFIGURATION - ANTENNA PATTERNS

13.1 General Comments

13.1.1 The photograph Fig. 5 shows the vehicle configured for the Alternate Orbit situation. It is assumed in this case that the High-Gain antenna has failed to deploy while the Solar Array is in normal orbit operation.

13.1.2 Survey patterns were made for the S-Band Omni Array with the High-Gain antenna stowed and with the Solar Array in both the (-X) and (-Z) positions. The cooler door was open.

13.1.3 Full data sets were measured for Port A at 2106 and 2288 MHz, and Power Contour plots were made.

13.2 S-Band Omni Array - Port A - Antenna - 2288 MHz
Antenna Patterns - Alternate Orbit Configuration

13.2.1 R.C. Polarization
Solar Array (-X)
High-Gain Antenna Stowed
Antenna Range Leg Length - 3000 Feet

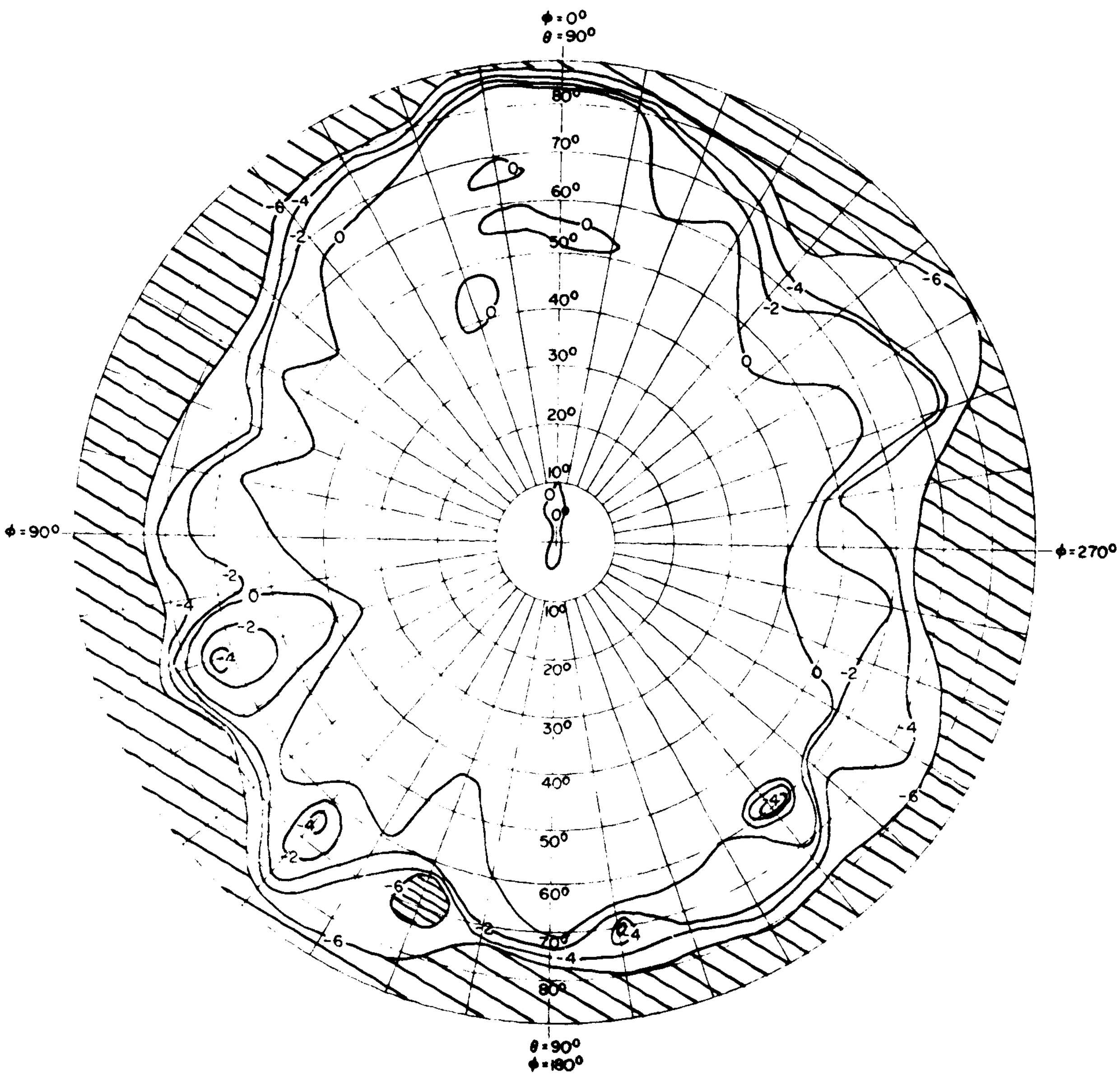

FIG. NO. 378 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT-D	POLARIZATION	R.C.
ANTENNA	S Band Omni Array	GAIN REFERENCE	SGH 1.7 HORN
FREQUENCY	2288 MHz	ENGINEER	C.C. Post
MODEL SCALE	FULL	PORT - A	
REMARKS	LOWER HEMISPHERE (TOWARD EARTH)		
	SOLAR PANEL (-X)		
	HIGH GAIN ANTENNA STOWED FOR LAUNCH		
	THEMATIC MAPPER COOLER DOOR OPEN		

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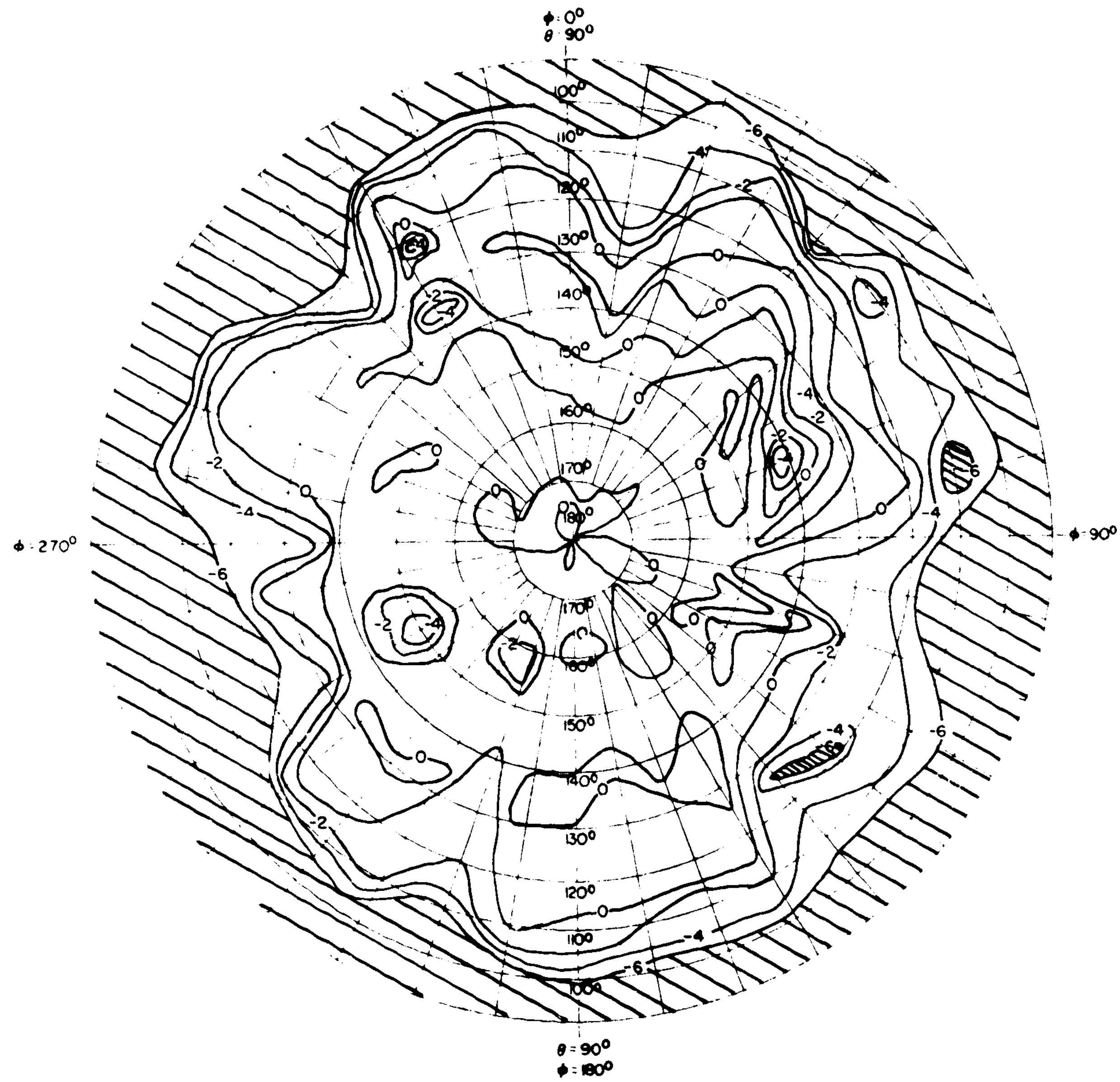

FIG. NO. 379 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT-D	**POLARIZATION**	R.C.
ANTENNA	S-Band Omni Array	**GAIN REFERENCE**	SGH 1.7 HORN
FREQUENCY	2288 MHz	**ENGINEER**	C.C. Post
MODEL SCALE	FULL	Port - A	
REMARKS	UPPER HEMISPHERE		
	SOLAR PANEL (X)		
	HIGH-GAIN ANTENNA STOWED FOR LAUNCH		
	THEMATIC MAPPER COOLER DOOR OPEN		

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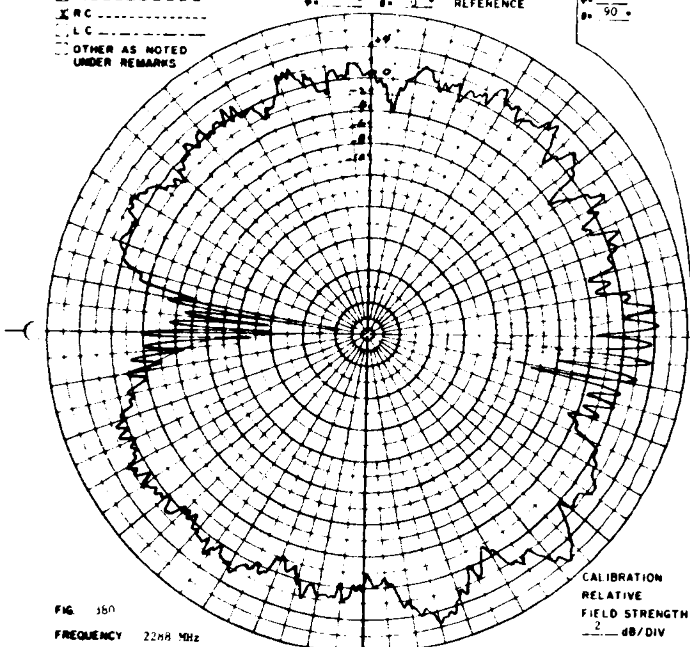

FIG 380
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Array-Port A
REMARKS High Gain Antenna Stowed For Launch
Solar Array (-X)
Cooler Door Open

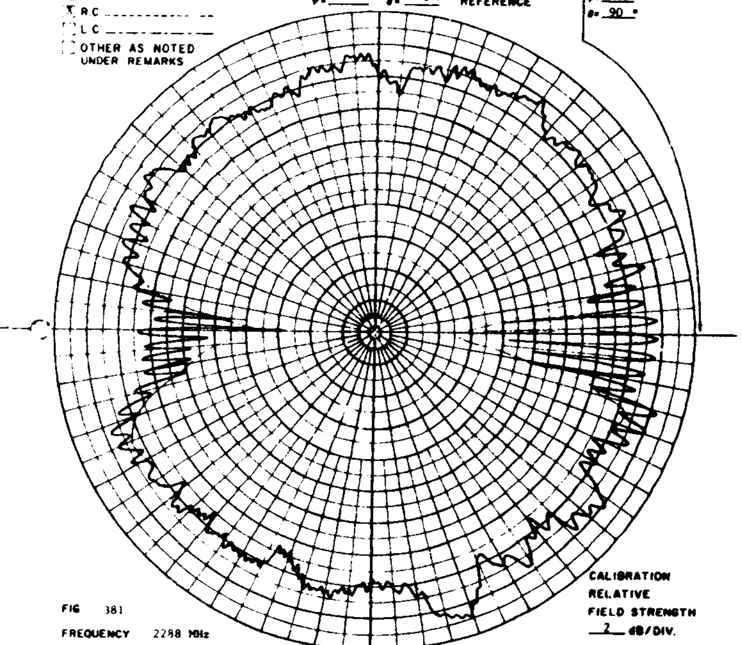

FIG 381
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Array-Port A
REMARKS High Gain Antenna Stowed For Launch
Solar Array (-X)
Cooler Door Open

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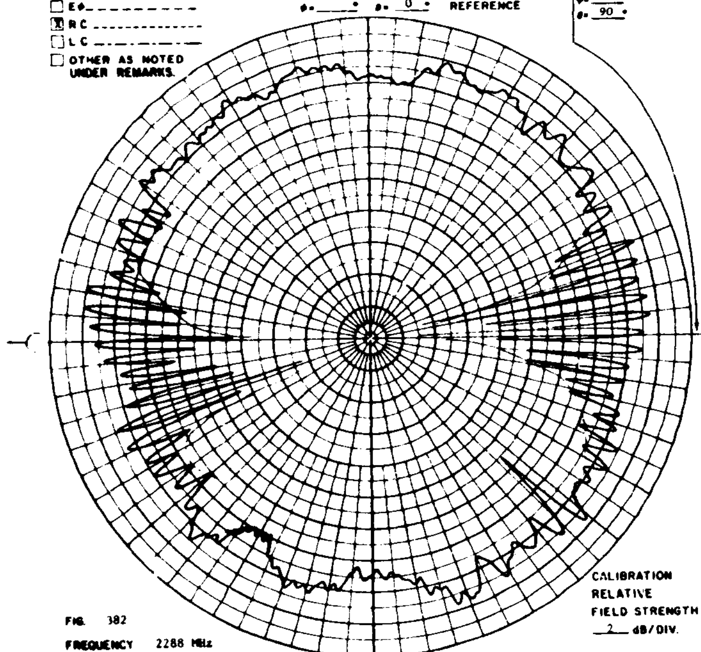
POLARIZATION
- [ ] GAIN REF
- [ ] Eθ
- [ ] Eϕ
- [x] R C
- [ ] L C
- [ ] OTHER AS NOTED UNDER REMARKS

ϕ= ___° θ= 0° COORDINATE REFERENCE

ϕ= 60°
θ= 90°



CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.

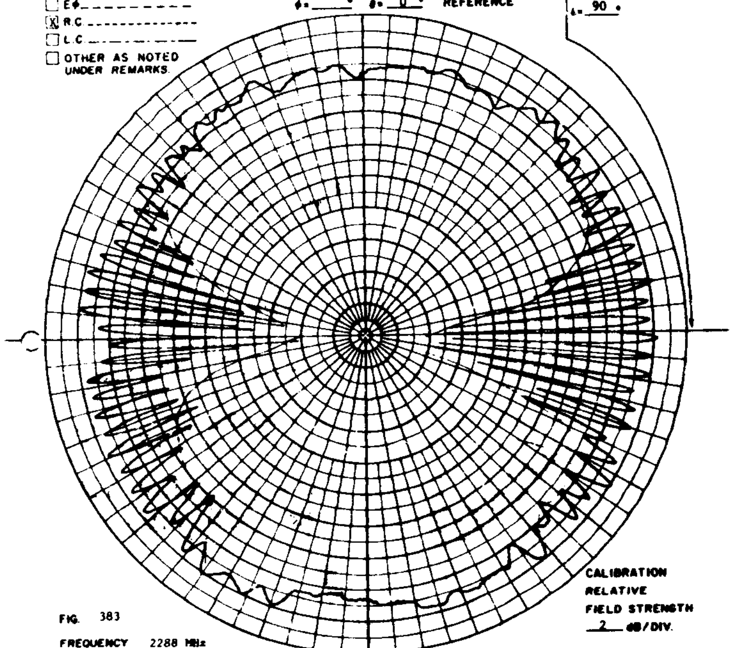
PSL№ 140080

FIG. 382
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Array-Port A
REMARKS High Gain Ante…a Stowed For Launch
Solar Array (-X)
Cooler Door Open

POLARIZATION
- [ ] GAIN REF
- [ ] Eθ
- [ ] Eϕ
- [x] R C
- [ ] L C
- [ ] OTHER AS NOTED UNDER REMARKS

ϕ= ___° θ= 0° COORDINATE REFERENCE

ϕ= 90°
θ= 90°



CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV.

PSL№ 140850

FIG. 383
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Array-Port A
REMARKS High Gain Antenna Stowed For Launch
Solar Array (-X)
Cooler Door Open

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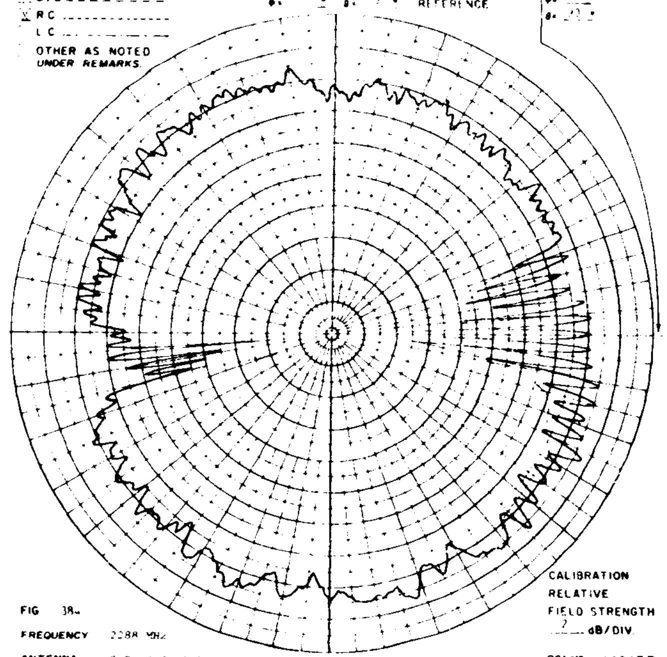
POLARIZATION
GAIN REF
Eθ
Eϕ
X RC
LC
OTHER AS NOTED UNDER REMARKS

COORDINATE REFERENCE



CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV

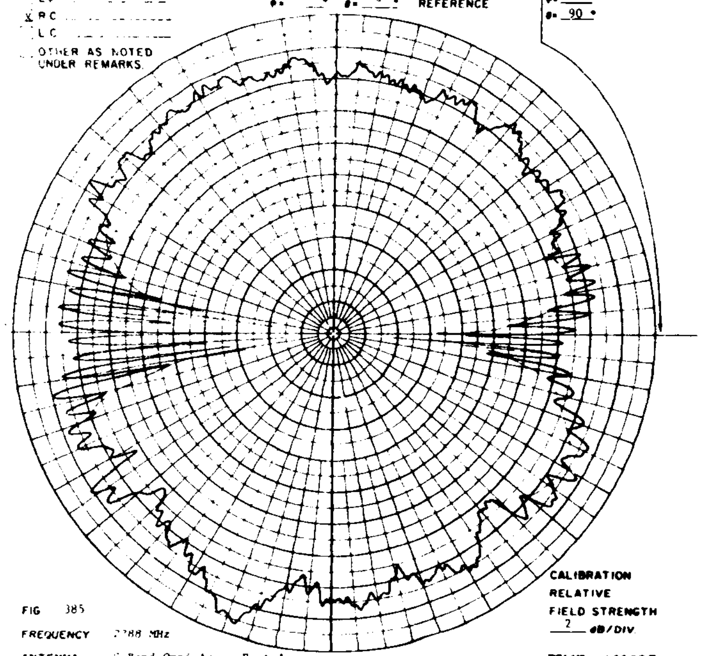
PSI № 14017

FIG 38-
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Array-Port A
REMARKS High Gain Antenna Stowed For Launch
Solar Array (-X)
Cooler Door Open

POLARIZATION
GAIN REF
Eθ
Eϕ
X RC
LC
OTHER AS NOTED UNDER REMARKS

COORDINATE REFERENCE

ϕ = 150°
θ = 90°



CALIBRATION
RELATIVE
FIELD STRENGTH
2 dB/DIV

PSI № 14020

FIG 385
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Array-Port A
REMARKS High Gain Antenna Stowed For Launch
Solar Array (-X)
Cooler Door Open

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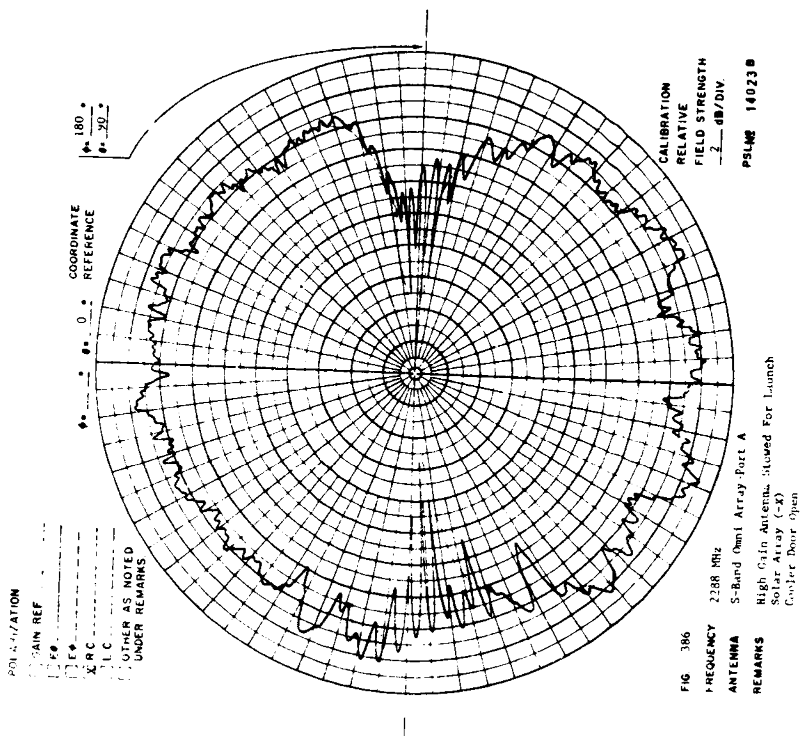

13.3 S-Band Omni Array - Port A - 2287.5 MHz
Antenna Pattern - Alternate Orbit Configuration

R.C. Polarization
Solar Array (-Z)
High-Gain Antenna Stowed for Launch

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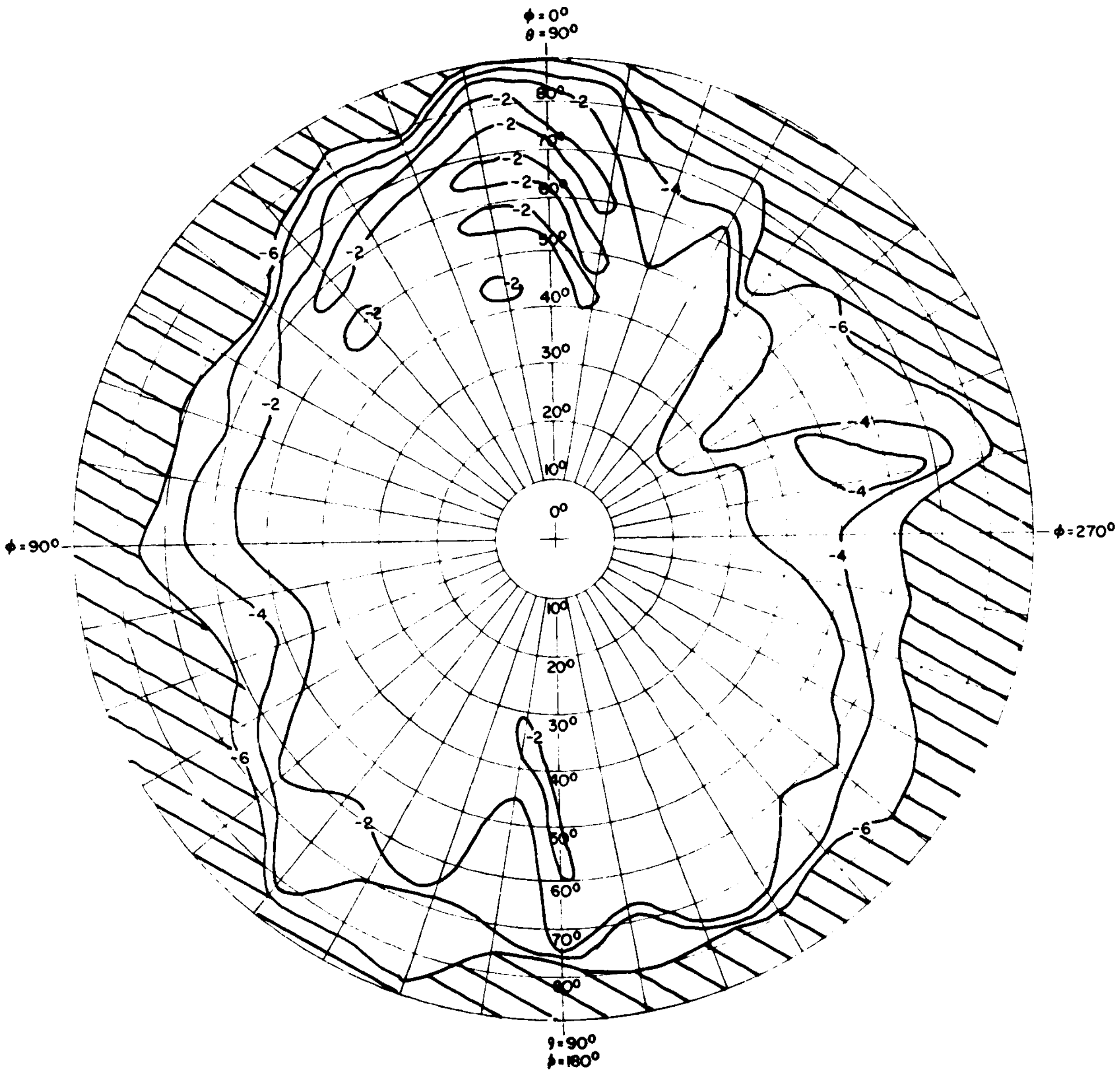

FIG. NO. 387 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT-D	POLARIZATION	R.C.
ANTENNA	S-Band Omni Array	GAIN REFERENCE	SGH-1.7 HORN
FREQUENCY	2288 MHz	ENGINEER	C.C. Post
MODEL SCALE	FULL		Port A
REMARKS			
	SOLAR PANEL (-Z)		
	HIGH-GAIN ANTENNA STOWED FOR LAUNCH (ALTERNATE ORBIT)		
	COOLER DOOR OPEN		

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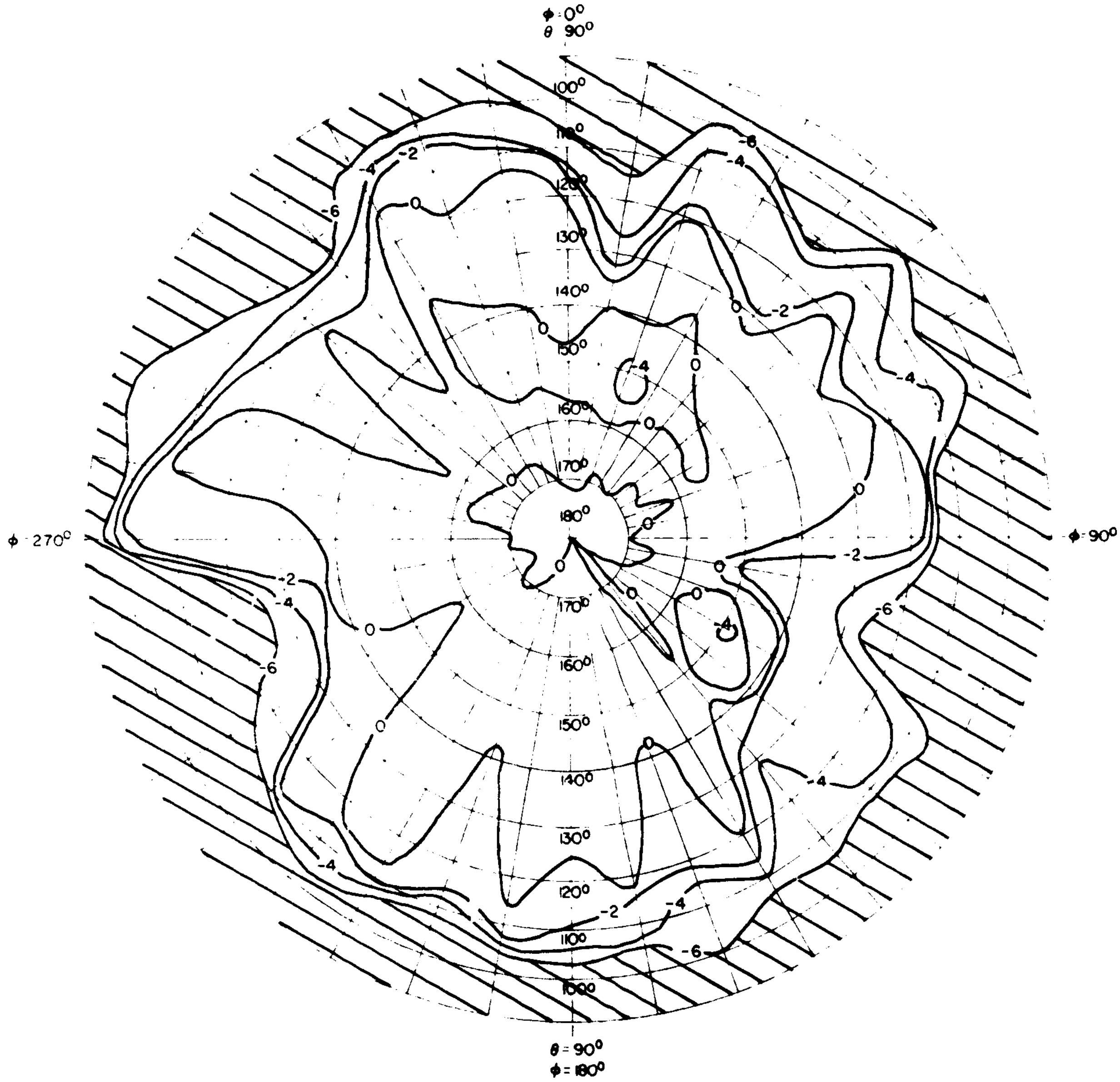


FIG. NO. 388 POWER CONTOUR GRAPH			
PROGRAM	LANDSAT-D	POLARIZATION	R.C.
ANTENNA	S-Band Omni Array	GAIN REFERENCE	SGH-1.7 HORN
FREQUENCY	2288 MHz	ENGINEER	C.C. Post
MODEL SCALE	FULL	INPUT	Port - A
REMARKS			
	SOLAR PANEL (-Z)		
	HIGH GAIN ANTENNA STOWED FOR LAUNCH (ALTERNATE ORBIT)		
	COOLER DOOR OPEN		

ORIGINAL PAGE IS OF POOR QUALITY

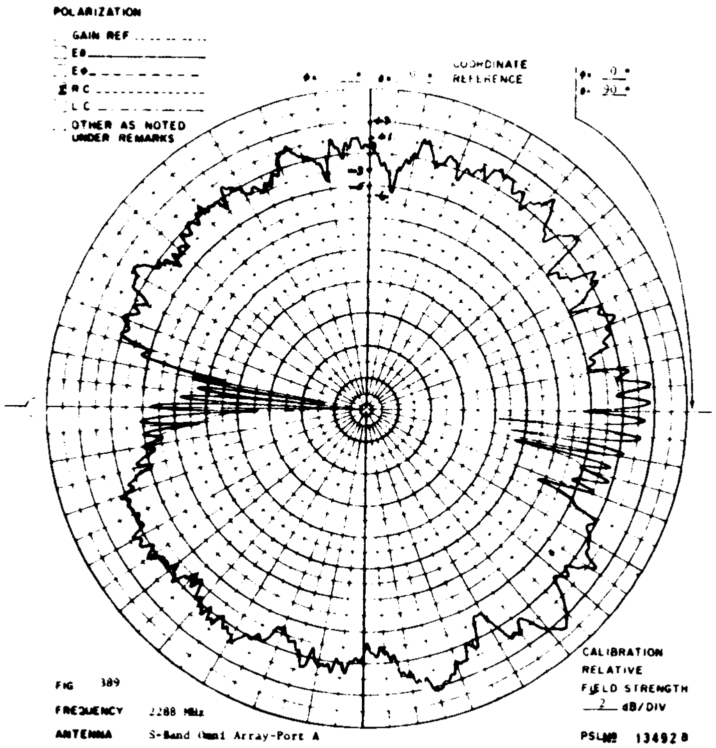


FIG 389
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Array-Port A
REMARKS Solar Array (-Z)
High Gain Antenna Stowed for Launch

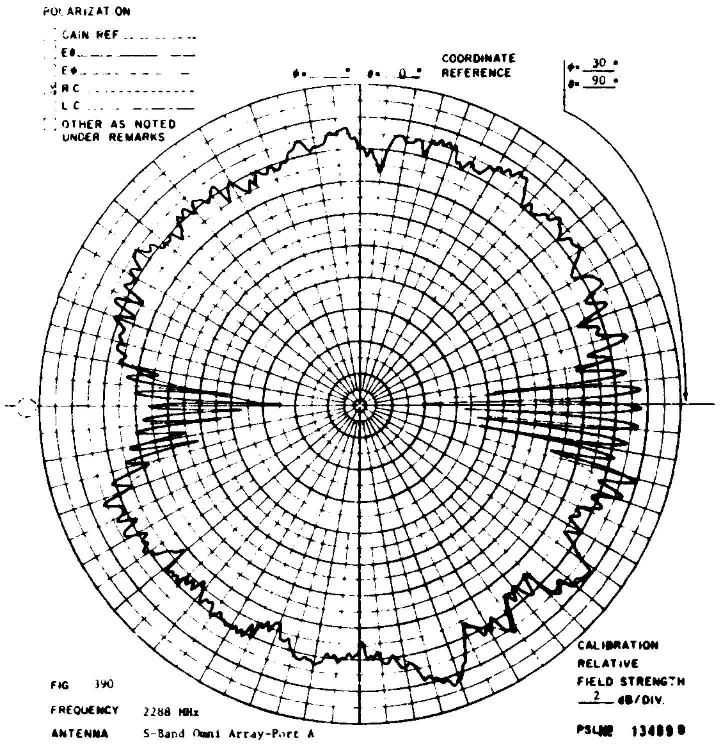


FIG 390
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Array-Port A
REMARKS Solar Array (-Z)
High Gain Antenna Stowed for Launch

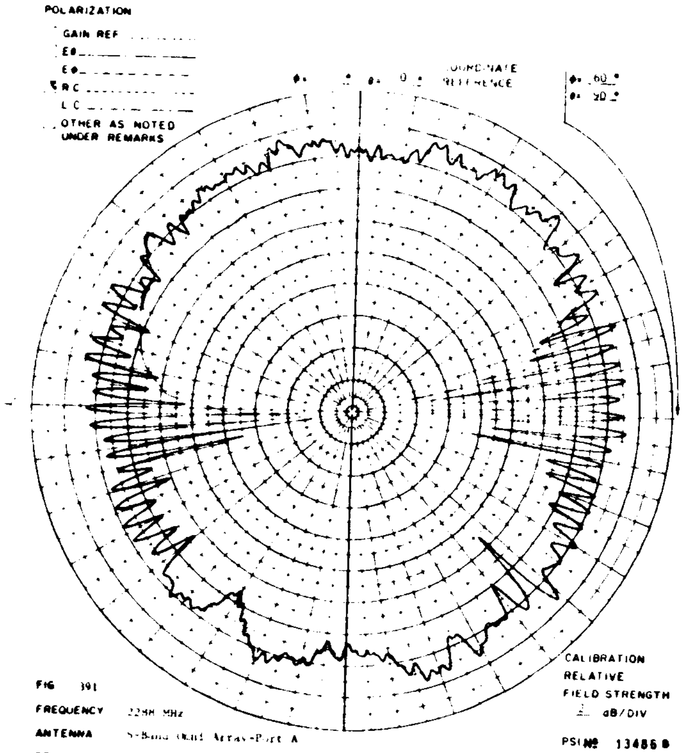


FIG 391
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Array-Port A
REMARKS Solar Array (-Z)
High Gain Antenna Stowed For Launch

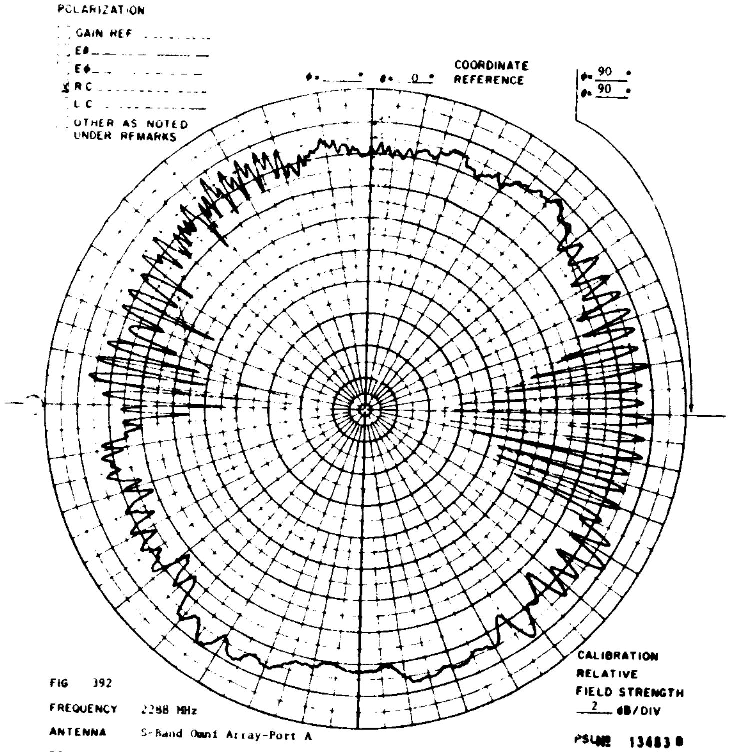
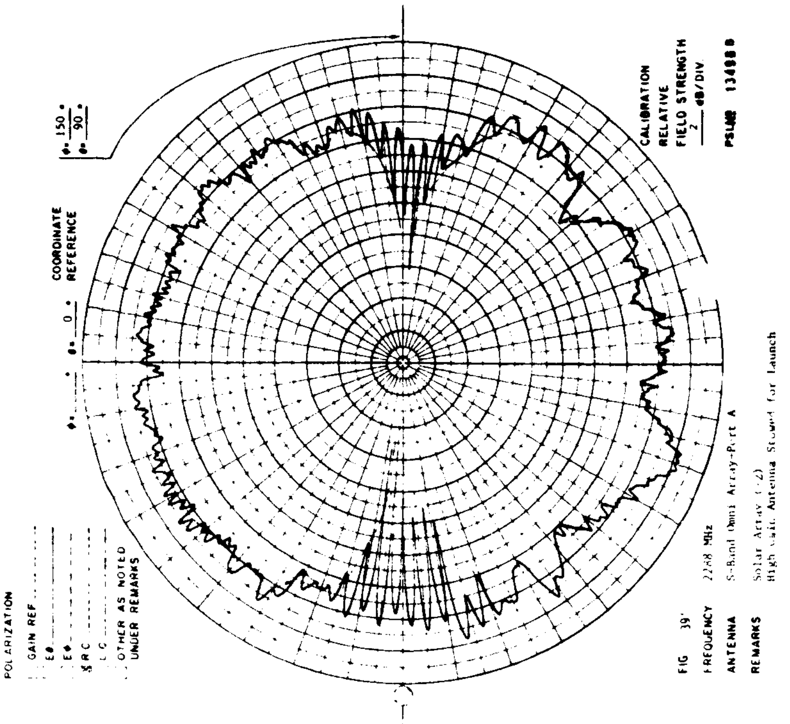
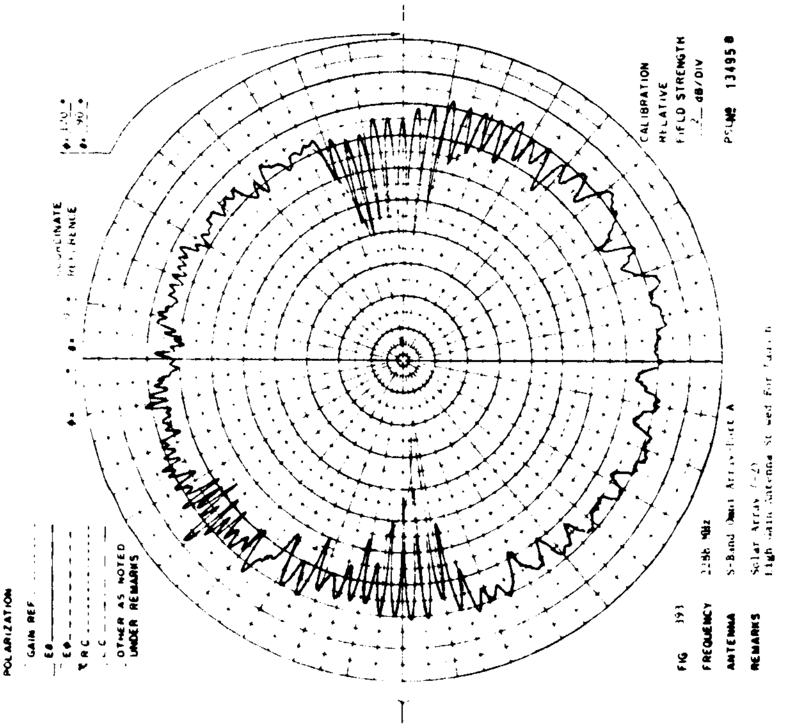
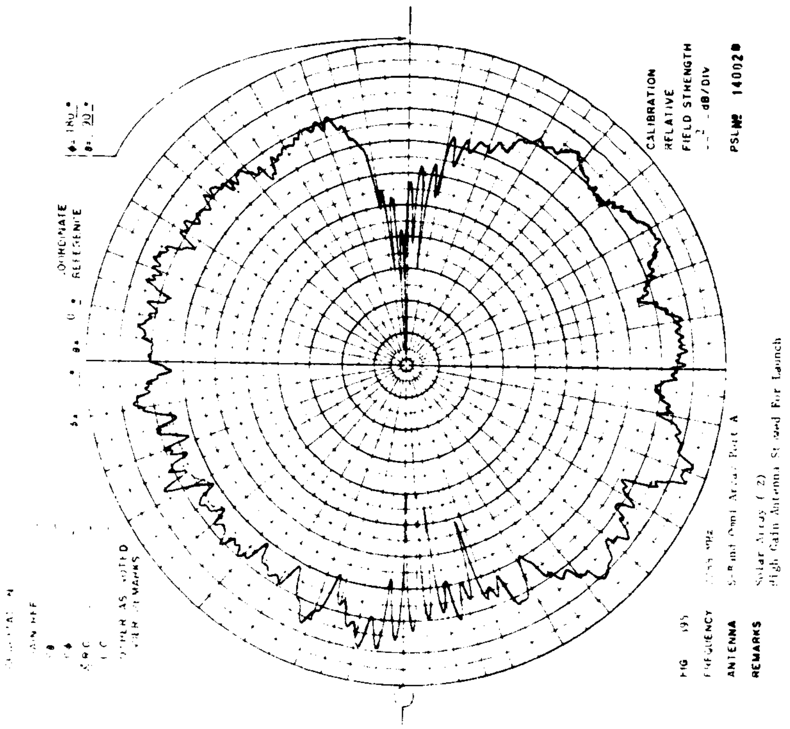


FIG 392
FREQUENCY 2288 MHz
ANTENNA S-Band Omni Array-Port A
REMARKS Solar Array (-Z)
High Gain Antenna Stowed For Launch

ORIGINAL PAGE IS OF POOR QUALITY






CALIBRATION
RELATIVE
FIELD STRENGTH
dB/DIV
PSL № 140020
COORDINATE
REFERENCE
FREQUENCY
ANTENNA
REMARKS
Solar Array (-Z)
High Gain Antenna Stowed For Launch